

**Response To Comments  
On The  
Statement of Basis**

**Former TRW Facility  
Sullivan, Missouri  
EPA I.D. #: MOD094390416**

**January 24, 2002**

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## **List of Acronyms**

bgs – below ground surface

CMS – Corrective Measures Study

DCA - Dichloroethane

DCCR – Description of Current Conditions Report

DCE - Dichloroethylene

DGLS – Missouri Department of Natural Resources Division of Geology & Land Survey

DOH – Missouri Department of Health

DWCP – Drinking Water Contingency Plan

EPA – United States Environmental Protection Agency

GMP – Groundwater Monitoring Plan

HWP – Missouri Department of Natural Resources, Hazardous Waste Program

MCL – Maximum Contaminant Level

MCLG – Maximum Contaminant Level Goal

MDNR – Missouri Department of Natural Resources, referred to as the department

ND – non detect

NPDES – National Pollutant Discharge Elimination System

P&TP – Pump and Treatment Plan

PCE - Tetrachloroethylene

PDWP – Missouri Department of Natural Resources, Public Drinking Water Program

ppb – parts per billion

ppm – parts per million

QAPP – Quality Assurance Project Plan

RTC – Response to Comments

RFA – RCRA Facility Assessment

RFI – RCRA Facility Investigation

SAP – Sampling and Analysis Plan

SB – Statement of Basis

SISR – Surface Impoundments Soil Report

TCE - Trichloroethylene

**Response to Comments  
on the Proposed Statement of Basis  
Former TRW Facility  
Sullivan, Missouri  
December 27, 2001**

**Introduction:**

This Response to Comments (RTC) document has been prepared under the authority of Section 3008(h) of the Resource Conservation and Recovery Act (RCRA) in accordance with the corrective action standards referenced in 40 CFR 264.101. This RTC document provides U.S. Environmental Protection Agency's (EPA's) Region 7 and the Missouri Department of Natural Resources' (hereafter referred to as the department) response to written comments on the proposed Statement of Basis (SB) from the public.

**Comments Received from the Public and the Agency's Responses:**

**Comment #1:**

**Public Availability Session Comment Form dated May 11, 2000:**

*"Most of the people in Sullivan did not find out about this problem until this weeks paper and I am told that we only have two weeks to study this problem. Since the EPA, DNR, etc. knew of this problem since at least 1983 I feel the citizens need at least 60 – 90 days to study this problem. In addition I want the EPA, DNR and TRW to answer all questions that the city was passing out and post them in the paper (front page). I also think the Department of Health needs to do a study looking at the rate of cancer in the Sullivan area compared to areas of like size." (Questionnaire attached)*

**Agency Response to Comment #1:**

The public comment period for the SB started April 12, 2000, and initially extended for 45 days until May 26, 2000. Public notices detailing this review opportunity were published in the Sullivan Independent News on April 12, April 19, April 26 and May 3. In addition, an availability session was held on May 11, 2000, to allow citizens to view information presented by the department, EPA, Missouri Department of Health (DOH) and TRW and have any representatives from these organizations respond to any questions at that time. During that availability session, numerous requests for a public hearing were submitted to the agencies in the form of individual comment forms and a petition signed by 57 persons. The requests were granted by the agencies, and a public hearing was held on June 29, 2000. The deadline for the public comment period on the SB was subsequently extended from May 26, 2000, to July 7, 2000. The SB was open for public comment for 86 days. The questions attached to the comment form are addressed by the EPA and the department below. These questions were handed out at the availability session and several commentors requested that we answer them. Due to the length of the responses, the agencies will not pursue printing them in the local paper, but will put a notice in the paper that these responses may be found at the Sullivan Library and will also mail them to everyone who commented or requested them. TRW has been informed of this request to respond to these questions; however, the agencies do not have the authority to require that TRW respond.

**Question 1: Has the contaminant plume been adequately defined? Is it expanding or increasing?**

The agencies strongly believe the contaminant plume has been adequately defined, based upon the evaluation of the data that was collected during the corrective action process. These activities were conducted in accordance with the procedures set forth in the corrective action regulations and guidance documents. A total of 41 monitoring wells have been installed by TRW since 1993 to define this plume. The locations of these monitoring wells were selected based upon the objective of defining the rate of contaminant plume movement and the horizontal and vertical extent of the plume that originated from the former TRW facility.

During these groundwater monitoring activities, the following contaminants of concern were identified: chromium, lead and several volatile organic compounds (VOCs) composed primarily of Trichlorethylene (TCE) and its degradation products, 1,2-Dichloroethylene (1,2 DCE), 1,2-Dichloroethane (1,2 DCA). Of these contaminants, TCE is the most widespread in the underlying groundwater. In defining the extent of the TCE contaminant plume, TRW was required to “step-out” and install monitoring wells until chemical data indicated non-detect or a TCE concentration approaching the detection limit of 1 ppb. The health-based maximum contaminant level (MCL) associated with TCE in drinking water is 5 ppb, as set forth in federal and state public drinking water regulations (see questions #4 and #5 in this response to comment #1 for a more detailed discussion of the MCL).

Monitoring well depths of approximately 150, 325 and 550 feet below ground surface (bgs) were chosen based upon the geology, depth to first encountered groundwater and the perceived hydrostratigraphic zones of the Ozark Aquifer. In the shallow zone (150 feet bgs), 26 monitoring wells were installed to monitor groundwater flow conditions and quality. In the intermediate zone (325 feet bgs), 11 monitoring wells were installed. In the deep zone (550 feet bgs), 4 monitoring wells were installed.

As discussed in the SB, the subsurface conditions in the Sullivan area are karstic, making groundwater monitoring extremely difficult. During the site investigation, fractured/displaced bedrock was observed in the subsurface which could provide preferential flow pathways that potentially allows TCE migration to bypass any standard monitoring wells. However, it is EPA and the department’s opinion that the installation and sampling of these monitoring wells, in combination with the operation and sampling of City of Sullivan municipal wells, has provided the information necessary to define the extent of the TCE plume that originated from the former TRW facility.

The vertical extent of the TCE plume was defined by use of deep monitoring wells in conjunction with groundwater modeling. TRW installed four deep zone wells to approximate depths of 550 feet bgs; one located on site (OBG-1DD), one to the north of the site (OBG-20DD), one to the west of the site (OBG-14DD), and one to the northeast of the site (OBG-18DD). Of these four wells, only the on-site well detected TCE contamination above the MCL. Due to the potential hazard of cross-polluting deeper groundwater, the extreme difficulty of installing monitoring wells at this depth, and the fact that only the on-site well had detected significant TCE, EPA and the department determined that groundwater modeling based upon this data would suffice to assess the vertical extent of contamination.

The modeling indicated that TCE at a concentration of 5 ppb has migrated to an approximate depth of 650 feet bgs underlying the former TRW facility. Since the Potosi Dolomite formation being monitored continues to a depth in excess of 800 feet bgs in this area, we determined that this modeling data, in conjunction with the continued deep zone monitoring of TCE around and directly underlying the site, was adequate.

Currently, several conditions have recently occurred that have affected the monitoring of the contaminant plume:

- Monitoring data indicates that TRW's most northerly shallow zone monitoring well, located just north of Municipal Well #2, has had decreasing water levels and now has insufficient water in the screened interval to adequately represent the chemical quality of the shallow aquifer at that point. A replacement shallow zone well screened to a deeper depth to characterize shallow groundwater flow in this northerly direction will have to be installed by TRW.
- The City of Sullivan turned off Municipal Well No. 2 in the 3<sup>rd</sup> quarter of 1999 as a result of facility-related contamination. As a result, Municipal Well No. 2 no longer controlled contaminant flow in the intermediate zone to the north of the former TRW facility. Although Municipal Well No. 2 is again active at the time of this RTC, TRW will have to install an additional intermediate depth well in this general area to maintain plume definition.
- The TCE plume in the intermediate zone to the south of the former TRW facility is defined by a combination of monitoring wells, OBG-14D (TCE not detected), OBG-19D (TCE not detected) and OBG-21D (TCE at 19-25 ppb). Potentiometric data collected quarterly has not indicated a discernable southerly flow component in the intermediate depth zone, so TRW was never required to step out from OBG-21D, which consistently has had TCE detections above the MCL in the range of 19-25 ppb. However, the City of Sullivan notified the agencies that Municipal Well No. 6, which is located south of OBG-21D, is back in operation.

The activation of this well could potentially affect the groundwater gradients at this depth in the intermediate and deep zones of the aquifer. Therefore, TRW is required to install an additional intermediate depth groundwater monitoring well to define the extent of TCE south of OBG-21D.

In response to the question whether the contaminant plume is expanding, based upon quarterly sampling reports from TRW over the past seven years, it appears that TCE concentrations are generally staying in the same range as initial sampling results showed. However, there are data trends that would indicate decreasing concentrations in the shallow zone wells, increasing concentrations in the on-site intermediate zone wells, and fluctuating concentrations in the on-site deep well (OBG-1DD). These fluctuations are likely attributable to the operation of the on-site shallow zone recovery system (decreased shallow zone TCE levels) and the effects of the City of Sullivan municipal well field operation (increased intermediate zone TCE levels). Concentrations in perimeter monitoring wells located away from the facility do not appear to be noticeably fluctuating, although there have been instances of incremental increases.

**Question 2: How can I be assured that the proposed remedies in the Statement of Basis will protect my health, safety and welfare?**

Based upon the risk assessment conducted as part of the RCRA Facility Investigation (RFI), groundwater is the primary exposure route for facility contaminants that could cause adverse health effects. Exposure of the public to contaminated groundwater above the health-based limits could occur if City of Sullivan municipal wells or private wells draw water from the contaminated portions of the Ozark Aquifer. Therefore, the primary goal of the proposed final remedy detailed in the SB is to prevent ingestion of groundwater that is contaminated above the MCL.

As a function of the GMP, TRW must monitor select municipal, private and monitoring wells over the duration of clean-up activities at the site. The estimated clean-up time frame is set at 30 years, although these requirements will continue to be applied to TRW as long as contamination attributable to a release from the former TRW facility exists in the environment above action levels (in this case, the MCL).

**Question 3: What are the long-term and short-term health effects of TCE?**

There are no known short-term health effects associated with drinking water contaminated with TCE at levels slightly above the 5 ppb MCL which are currently seen in City of Sullivan Municipal Wells No. 2 and No. 8. Long-term consumption of water contaminated with TCE at levels above the MCL could result in liver and kidney damage, nervous system effects, impaired immune system function, and impaired fetal development in pregnant woman, although the extent of some of these effects is not yet clear. Breathing small concentrations of TCE for long periods may cause headaches, lung irritation, dizziness, poor coordination and difficulty concentrating. To define “long-term,” it is typically set at a length of 70 years exposure in health risk calculations, at which time there is also an increase in the risk of developing cancer as a result of the long-term exposure.

Breathing or ingestion of large amounts of TCE at levels of 30,000 parts per million (ppm) may cause nausea, liver and kidney damage, convulsions, impaired heart function, coma or death. For comparative purposes only, the highest concentrations detected during on-site contaminant plume monitoring from the TRW facility indicated a maximum level of 51 ppm (reported in December, 1997 from monitoring well OBG-2S). The concentration in that monitoring well from the 4th Quarter 2000 sampling event indicates TCE at 25 ppm. The highest concentration historically detected in any municipal well is 10 ppb (.010 ppm).

For more information on the health effects of TCE, visit the Agency for Toxic Substances and Disease Registry web site at <http://www.atsdr.cdc.gov/tfacts19.html>.

**Question 4: Why was the maximum contaminant level set at 5 parts per billion by the state and federal entities?**



Under the Safe Drinking Water Act, the EPA is required to set standards for the quality of public drinking water, to protect human health. In order to set standards, EPA considers the available information on health risks of a contaminant, and the ability of public water systems to test for contamination, and to provide effective treatment.

The available health effects information for TCE indicates toxic effects can occur at high levels of exposure. TCE has been shown to cause cancer in laboratory animals where exposure occurs at high levels over their lifetimes. Chemicals that cause cancer in laboratory animals are considered to have the potential for increasing the risk of cancer in humans, at low levels of exposure.

EPA set a maximum contaminant level (MCL) for TCE of 5 ppb based on its toxic and potentially carcinogenic health effects. For contaminants like TCE that are considered probably human carcinogens, the goal is to have no TCE in drinking water. EPA has set the standard of 5 ppb to be as close as practical to the goal of zero. Ingestion of drinking water that meets this standard is associated with little to none of this risk, and should be considered safe.

More information on the development of an MCL and other drinking water standards and health advisories may be found at the following web sites: <http://Error! Bookmark not defined.>, <http://Error! Bookmark not defined.> and [Error! Bookmark not defined.](http://Error! Bookmark not defined.).

**Question 5: What is my chance of experiencing health problems consuming water contaminated with TCE for a lifetime?**

The toxicity of TCE is currently still under review by EPA. Using the most recent values, the lifetime cancer risk from drinking water with 5 ppb TCE is no higher than one chance in 400,000. Interpreted as one person in 400,000 drinking water contaminated with TCE at the 5 ppb level over his/her lifetime developing cancer caused directly by this consumption. EPA's 5 ppb drinking water standard for TCE became effective on January 9, 1989.

**Question 6: How can I be assured that the drinking water supplied to me is safe?**

As a condition of the agencies' final remedy set forth in the state-issued order, all City of Sullivan municipal wells should be switched back to quarterly sampling by TRW as to be set forth in the GMP. Currently, only Municipal Wells No. 2, No. 8, No. 9 and No. 11 are sampled quarterly, while the other municipal wells are sampled annually. In addition to TRW's sampling activity, the City of Sullivan is also required to conduct quarterly sampling under the Primary Safe Drinking Water Regulations as enforced by the department's Public Drinking Water Program (PDWP). If either of these sampling activities indicates a contaminant above the MCL, notifications will be made to all parties involved (the department's PDWP, City of Sullivan, TRW and the public), at which point follow-up activities will be initiated, as appropriate.

To date, two City of Sullivan municipal wells were shut down (No. 2 and No. 8) due to TCE contamination from the former TRW facility. The City of Sullivan immediately turned these two municipal wells off once sampling data indicated that the 5 ppb MCL for TCE had been exceeded and TRW began DWCP activities. In accordance with this plan, once a treatment

system is in-place at a contaminated municipal (or private) well, operation and maintenance requirements will be TRW's responsibility. This will include confirmatory sampling of the treatment system effluent to verify that the system is performing adequately and that no exposure to water above the MCL is occurring. Municipal Well No. 2 currently has a treatment system installed by TRW and fully operating at the time of this response.

Regarding private wells, under the current GMP, TRW is sampling six private wells that are located in the vicinity of the TRW facility. For other private wells outside of the GMP sampling range, the department's Superfund Program, in conjunction with the DOH, are currently assisting Sullivan residents who wish to have their private water supply wells sampled. Names/addresses of residents were collected at the availability session held in Sullivan on May 11, 2000, and the public hearing on June 29, 2000. The department's Superfund Program has already conducted sampling of a number of these wells in the area of Oak Grove Village as part of activities investigating the source of TCE in the Oak Grove Village water supply well. In addition to the TCE, benzene and tetrachloroethylene (PCE) have also historically been detected in the Oak Grove Village water supply well. If you have questions on these sampling activities associated with the Oak Grove Village investigation, please contact Candice McGhee of the Superfund Program at (573) 751-1738.

**Question 7: Citizens, business owners and industries suffer because of the public perception of a city with contaminated water. Who will be responsible for the loss of income or potential income as a result of public perception of our contaminated water supply?**

This question goes beyond the scope and authority of the corrective action process as set forth in the Resource, Conservation and Recovery Act (RCRA) and state law.

**Question 8: How long will TRW be responsible for the contamination they caused affecting the City, and private, water supplies in the area?**

As set forth in the agencies' proposed remedy and as previously discussed in the response to question #2 in this first comment, TRW will be required to conduct monitoring and on-site remedial activities for contaminated groundwater as long as contamination exists above the proposed clean-up levels.

Regardless of TRW's participation in the provision of adequate water supply, the City of Sullivan is still responsible for the overall quality of drinking water delivered to consumers. There are over 85 standards for public drinking water for which the city is required to routinely test the water. In addition, the public water system must meet recordkeeping, reporting, public notification, operator certification, and performance standards. Under the Safe Drinking Water Act, the owner of the water supply, in this case the City of Sullivan, is responsible for seeing that all of these standards are met, and that consumers are informed should there be a problem. The testing and enforcement of these standards is overseen by the department's Public Drinking Water Program.

**Question 9: What is the scope of the geographic area that TRW will be responsible for?**

TRW is required to clean up the releases from its former facility. The geographical area that TRW is responsible for is determined by the agencies based upon a number of factors. They include:

- The baseline for responsibility is plume extent as determined by groundwater monitoring wells with detected concentrations of site-related contaminants.
- This baseline for responsibility is then further evaluated with respect to potentiometric data and groundwater gradients. Groundwater gradients include those imposed by the operation of nearby municipal supply wells and their resultant cones of capture.
- This boundary of responsibility is further evaluated based upon the presence of any geologic structural features such as faults and voids (typically identified in a general area by the evaluation of monitoring well bore logs of underlying geologic formations).

The agencies' evaluation of the current extent of the TCE plume from the former TRW facility discussed below is based upon the 2000 Annual Groundwater Assessment Report.

Shallow zone of the aquifer (150 feet bgs):

- Westerly Direction: Defined by the non-detect (ND) readings at monitoring wells OBG-17S and OBG-14S.
- Southerly Direction: Defined by ND reading at OBG-23S.
- Easterly Direction: Defined by ND readings at OBG-19S and OBG-12S.
- Northeasterly Direction: Defined by ND reading at OBG 18S.
- Northerly Direction: The TCE plume extends to the north in the shallow zone, which is determined to be the down-gradient direction from the former TRW facility. The plume currently extends beyond OBG-11S (10 ppb in 4<sup>th</sup> Quarter 2000), which is just south of Municipal Well No. 2. Monitoring well OBG-20S, located just north of Municipal Well No. 2, went dry in the 2<sup>nd</sup> Quarter of 1999.

Intermediate zone of the aquifer (325 feet bgs):

- Westerly Direction: The agencies interpret the TCE plume to be bounded to the west by Municipal Well No. 8 when it is active. This assessment is based upon the estimated cone of capture of this well when in operation and the influence on groundwater flow from faulting in the area as indicated in the geologic data collected during the RFI. When Municipal Well No. 8 was in operation, TCE had been detected as high as 10 ppb (water was being pumped to waste during treatment system testing/optimization), but levels have dropped to around 1.5 ppb since pumping of this well ceased. TCE levels may rise back in the range of 10 ppb or higher once pumping resumes at that municipal well when a treatment system is in-place.

- Southerly Direction: The southerly boundary of the plume is defined by a combination of the ND readings at OBG-19D and a relatively non-fluctuating TCE detection of 19-25 ppb at OBG-21D.
- Easterly Direction: Defined by the low TCE concentration (2 ppb) readings at OBG-12D.
- Northeasterly Direction: Defined by the ND reading at 18D.
- Northerly Direction: The TCE plume to the north was defined by a combination of an operating Municipal Well No. 2, which created a cone of capture that would appear to prevent further TCE plume migration to the north, and OBG-11D (located to the south of Municipal Well No. 2). OBG-11D is the most northerly intermediate monitoring well; however, the presence of TCE in the well around 10 ppb indicates that an additional monitoring well to the north of Municipal Well No. 2 is necessary to adequately define the extent of TCE in this zone of the aquifer. An additional intermediate monitoring well located north of Municipal Well No. 2 is required as part of the final remedy. If TCE is detected at or above 5 ppb in the new intermediate well, TRW will moveout further to the north in the intermediate zone of the aquifer.

Deep zone of the aquifer (550 feet bgs):

- TCE has been detected in OBG-1DD, the on-site deep monitoring well. Concentrations of TCE from this monitoring well have been in the range of 23-130 ppb, with the latest concentrations (in the year 2000) being 57 ppb and 37 ppb. The other three deep monitoring wells located east, north and northeast from the site have all been ND or occasionally 1 ppb.

**Question 10: What will happen if the area of contamination is shown to be expanding?**

As has been referenced in several previous responses to questions, TRW will maintain definition of the contaminant plume, as set forth by the conditions of the GMP.

**Question 11: If private wells or city wells become contaminated or increase their contamination level in the future, who will be responsible for ensuring safe water?**

As previously discussed in responses to questions #2, #6 and #8, TRW will be responsible for providing potable water from any contaminated water supply well (provided TRW is determined to be responsible by the agencies), either by way of a treatment system or other alternative method contained in the DWCP.

**Question 12: Who will be responsible for providing proof of where the contamination originated?**

TRW, with oversight by EPA and the department, has investigated the extent of the releases from the former TRW facility. EPA and the department have determined that the contaminant plume has been adequately defined to proceed with remedy selection.

**Question 13: Who will determine if the proof of contamination is valid?**

The agencies evaluate the adequacy and validity of data upon receipt and review, be it chemical analyses, modeling or field measurement data. As part of the RFI activities set forth in the federally-issued consent order, TRW was required to develop a sampling and analysis plan (SAP) and a quality assurance plan. These reports stipulate the procedures to be followed when collecting and analyzing groundwater (and other media) samples and decontamination procedures. Also included in these reports is a design and installation protocol for groundwater monitoring wells.

Chemical data submitted to the agencies by TRW in the quarterly groundwater sampling reports have the laboratories quality assurance documentation included, such as duplicate sample analyses, spike recovery percentage, decontamination water analysis and trip blanks. These quality assurance controls are consistent with other corrective action projects in the state of Missouri. In addition, the department's HWP splits groundwater samples with facilities at a minimum of once every four years when doing evaluations of groundwater monitoring systems.

**Question 14: Who will enforce the responsibility issue if it is found to have originated from the TRW facility?**

Work to date has been performed by TRW under a federally issued corrective action consent order. Because the state of Missouri has adopted corrective action legislation, EPA and the department have agreed that future corrective action enforcement will be pursued by the department.

**Question 15: What time frame will I be subjected to in utilizing contaminated water before safe water is provided to me?**

Under the current federal consent order, the DWCP has a schedule of action set out for TRW that is described as follows:

1. Upon receipt of analytical data indicating a private or municipal water supply well has gone above the MCL, TRW must notify EPA and the department by telephone within one day of receipt and fax a written copy of the data to EPA and the department within two business days of receipt.
2. A determination is then made by the agencies as to whether the release is due to releases from the former TRW facility (evaluation typically takes a day or two).
3. A confirmatory sample is to be taken by TRW within seven days of the telephone notification to the agencies. Analysis should be obtained within ten days of sample collection.
4. Following the first confirmed sample, the well is tested once per week for three consecutive weeks.

5. For private water supply wells, if the average of two consecutive confirmatory samples are greater than two times the MCL for the contaminant or if the average of all four samples is greater than the MCL, TRW is to implement the DWCP and provide an alternative drinking water source.
6. For municipal water supply wells, if the average of four consecutive confirmatory samples is greater than two times the MCL for the contaminant, TRW is to implement the DWCP and provide an alternative drinking water source. If the average is less than two times the MCL, TRW will institute a Tap Sampling Program at residences expected to receive the highest concentration of the contaminant.
7. The Tap Sampling Program is composed of four consecutive samples, collected once per week. If the average of the four samples is greater than the MCL, TRW must implement the DWCP and provide an alternative drinking water source.

By following this implementation plan, a person could be exposed to a contaminant at or slightly above the MCL for a period of approximately seven weeks at a private well and eleven weeks for a municipal well system. These timeframes are determined from the confirmatory sampling requirements of the DWCP and an assumption of a two-week delay before TRW's contract laboratory receives sample analysis that has been quality checked.

It should be noted that, for the impacted municipal wells where the contamination has been attributed to TRW, the City of Sullivan has had the water resources available to shut down the water supply well immediately upon being notified of the initial sample indicating that it was above the MCL. In addition, TRW has foregone the other confirmatory sampling steps in an effort to expedite the implementation of the DWCP and has proceeded directly into design and installation activities at that time. Design, installation and regulatory approval of these systems are still ongoing at the time of this RTC. The agencies have encouraged the City of Sullivan and TRW to continue to coordinate these discussions so as to allow regulatory approval and reactivation of municipal water supply wells in as an expedient a manner as possible.

**Question 16: Has any research been done in the Sullivan area regarding increases in cancer rates or other health aspects compared to the normal population? Are any studies planned? Why not?**

The DOH has not launched a formal cancer cluster investigation because no request was made and the current exposure does not appear to be a significant risk to the community that would lead to any adverse health effects. If there is sufficient community concern, the DOH's Bureau of Cancer Control may open a cancer cluster investigation. Such an investigation is not a passive exercise on the part of the community and would require extensive community involvement. If additional information is required on this issue, please contact Randy Maley, MDOH, at (573) 751-6404.

**Question 17: At what level of measurement does TCE contamination have to attain in the drinking water supply before the water is deemed unusable?**

The only applicable limit to address this question is the MCL, which, for TCE in drinking water is 5 ppb. If TCE levels exceed that amount, it is a violation of the Missouri Safe Drinking Water law and regulations for the water to be supplied as drinking water. However, water exceeding an MCL could be deemed safe for activities such as irrigation or production, depending upon how excessively the water is contaminated.

**Question 18: What measurements of indicators will be used in determining whether or not TRW's area of responsibility has increased?**

As previously discussed, under the current federal consent order, the agencies will evaluate all groundwater and other associated data that is available in making a determination of responsibility for any detected contamination. This data is generally composed of chemical and potentiometric data collected by TRW during quarterly monitoring and the data collected during TRW's RFI. Additional information may also come in the form of monitoring results from the HWP's Superfund Section, the PDWP, the DGLS, the DOH, and/or any new pertinent information that is made available to the HWP.

**Question 19: Has TCE been detected in any private wells? Where? Was there any corrective action taken or is any planned?**

The DOH has sampled private wells in, or near, the north areas of Sullivan. During the sampling activities, we noted that all but two private wells were below the public drinking water standard of 5 ppb. All well owners were contacted by the department to obtain permission to access their property and were then notified of the sampling results. The DOH does not have the authority to require corrective action on private wells. Of the two private wells above the 5 ppb action level, one was being sampled by TRW under the requirements of the GMP as set forth in the current federal consent order. This occurrence of TCE in the private well could not be attributed to a release from the former TRW facility due to the extreme distance from the site and the number of non-detect sampling locations found in-between. However, TRW voluntarily decided to address the problem at the private well by extending the city's water supply line to the household. The remaining private well is not being sampled under the provisions of the GMP due to the distance away from the site and was not addressed by TRW. The agencies continue to assist the remaining private well owner in association with the department's Superfund Section. Currently, TRW samples four private wells near its facility as set forth in the GMP; no TCE has been detected in any of these wells. The DOH again sampled wells along Springdale Road & Highway AF in September 1998. One additional well on Hwy AF was discovered which contained TCE below the MCL at a concentration of 3.0 ppb.

The department's Superfund Section has also conducted several private well sampling investigations. They include:

- (1) Sampling conducted for the "Additional Site Assessment Report, Oak Grove Village Well" dated March 31, 1998. Samples were collected in September 1997. Six private wells along with Oak Grove Village's municipal well were tested. Two private wells on Highway AF had TCE at concentrations of 6.3 ppb and 0.8 ppb.

- (2) Sampling conducted by the department's Superfund Section for the "Pre-CERCLIS Site Screening Report, Highway AF Wells" dated May 18, 1998. Samples were collected in April 1998. Eight private wells were sampled. Of these eight wells on Hwy. AF, five had detectable TCE concentrations of 6.0 ppb, 1.0 ppb (both previously detected), 5.3 ppb, 0.6 ppb and .9 ppb. The private well contaminated with 6.0 ppb TCE was closed, and the home was connected to the city's water supply by TRW.
- (3) Private well sampling conducted during the year 2000 by the department's Superfund Section while investigating the contamination at the Oak Grove Village water supply well detected two additional private wells in the Oak Grove Village vicinity that are above the 5 ppb MCL.

We note that water well sampling was not done for the "Pre-CERCLIS Site Screening Report, Gerry's Lagoon" dated March 25, 1999. Currently, the releases detected in the Oak Grove Village water supply well cannot be attributed to the TRW facility, and additional investigations by the department's Superfund Section are planned in the vicinity of Oak Grove Village to determine the source. If you have any questions regarding this investigation, or information pertaining to TCE contamination in this area, please contact Candy McGhee, Missouri Department of Natural Resources' Superfund Section, at (573) 751-1738.

**Question 20: If the City of Sullivan continues to lose wells to contamination, will the City possibly face a water shortage?**

The City of Sullivan may face a water shortage if municipal wells continue to be shut down due to contamination. City officials would provide a more accurate response on this issue than the agencies. The department is encouraging the city and TRW to cooperate and expedite their efforts to develop and install the treatment systems at municipal wells so as to help ensure that shortages of water resources do not occur. Both parties are aware of the federal consent order between EPA and TRW and the contingencies that this plan enforces.

**Question 21: If the City is responsible for installing additional wells or treatment systems because of TRW's contamination, won't this possibly increase my water rate cost to cover the additional costs?**

It would appear that only city officials could accurately answer this question once the economics of the remedy are more evident. The goal of the final remedy is to hold TRW responsible for cleaning up any releases that can be attributed to the former TRW facility.

**Questionnaire Statement: I am opposed to the proposed remedy. I want to request a public hearing so that my views will become part of the public record.**

A public hearing was held on June 29, 2000, at the Sullivan Elementary School gymnasium. All comments received are addressed in this RTC.

**Questionnaire Statement: I do not want treated water. I want new, healthy water and you are not providing this. I am opposed to having treated water in my system. Your**



**proposed remedy includes using the public drinking water system as part of the remedy of TRW contamination, this is totally unacceptable.**

The public drinking water standards that are consistently applied to public water supply systems in Missouri are the MCLs. These levels are selected based upon risk-based standards and achievable contaminant removal technologies. The department's PDWP as well as the Missouri DOH deem water with contaminants below the MCL safe as a drinking water source. Therefore, these same regulations that are consistent with those applied to any other water supply source in Missouri will be enforced as part of the final remedy.

## **Comment #2**

### **Public Availability Session - Comment Forms dated May 11, 2000:**

Several verbal and written requests for a public hearing were made. In addition, the HWP was presented a petition signed by 57 people requesting a public hearing.

### **Agency Response to Comment #2:**

The public hearing request was granted and a public hearing was held on June 29, 2000, at the Sullivan Elementary School.

## **Comment #3**

### **Mailed in Comment dated May 15, 2000:**

From: The City of Sullivan

*"As Mayor of the City of Sullivan on behalf of concerned citizens, I hereby request a Public Hearing on the proposed remedy and other corrective measures, alternatives for the cleanup of hazardous waste released in groundwater at the Former TRW, Inc. facility, 300 Ramsey Street, Sullivan, Missouri. The request is made to address the following public concerns indicated to us as a result of the Availability Session held on the 11<sup>th</sup> of this month:*

- 1.) The extent of the contamination is not defined and there is evidence that the contaminant plume is dynamic in nature. There is very real concern among the Public that the full extent of the contamination will not be known for many years. It is impossible to predict which City wells may become inoperable, without treatment in the future, as a result of the Former Ramsey Street activity, and which may not be covered by the upcoming Consent Order.*
- 2.) The patch work approach/different treatment systems that is being proposed by TRW and reflected in the Statement of Basis regarding the water treatment systems for the City municipal wells No. 2 and No. 8.*
- 3.) The time allowed to review the Administrative Record is not sufficient. The Administrative Record was updated on April 7, 2000, at the Sullivan Public Library and the information is extensive.*
- 4.) The Final Remedy proposed for the corrective action is premature.*

*Attached is a petition submitted to me by citizens in attendance at the Availability Session requesting a Public Hearing. The petition contains 57 signatures."*

### **Agency Response to Comment #3:**

- 1.) The agencies consider the plume defined to the extent that monitoring wells can determine the rate and extent of contamination in a karstic subsurface environment. The monitoring well system and chemical data are discussed in the response to comment #1, questions #9, #10 and #11. The City is correct that it is difficult to accurately predict which (if any) City of Sullivan-owned municipal wells could next become contaminated with TCE above the MCL. However, the agencies feel this final remedy applied to TRW, in conjunction with continued communication, assistance and information sharing between City of Sullivan officials and the department, is the most appropriate and plausible approach to solving these problems. The agencies will be as expedient as possible in making contamination responsibility determinations, in addition to offering assistance/advice to the City of Sullivan as dictated by any public water supply needs and the continued goal of protection of human health and the environment.
- 2.) Under a state-issued order, the treatment systems to be constructed and operated by TRW at City of Sullivan municipal wells as part of the DWCP will be limited to a best demonstrated, proven technologies (such as the air stripper unit designed for Municipal Well No. 2).
- 3.) The department understands the volume of material included in the administrative record is significant and a considerable task to review; however, the public comment period length of 45 days was set in accordance with EPA's guidance documents governing public participation for corrective action carried out under a consent order. It should also be noted that EPA's RCRA Public Participation Manual (EPA530-R-96-007) acknowledges that there are no regulatory or statutory mandates for public participation under a §3008(h) order. However, as matter of policy, EPA has maintained that the opportunities for public participation when corrective action is conducted under an order should generally be equivalent to that which would occur at permitted facilities.

Due to the heightened level of public interest in corrective action at the former TRW facility, the agencies hosted a public availability session at the Sullivan Community Center on February 18, 1998, to highlight the status of corrective action activities, including the proposed treatment system at Municipal Well No. 8. Corrective action data, summary reports and a pilot-scale treatment unit similar to that currently in place at Municipal Well No. 8, were displayed for questions and/or comment. Another public availability session was held on May 11, 2000, during the initial 45-day public comment period for the SB. The agencies, as well as the Missouri DOH and TRW representatives, were available throughout these sessions to answer questions or address any concerns city officials or residents might have. Representatives from the City of Sullivan engineering staff were also in attendance at these meetings and made themselves available for questions. These availability sessions were done in an effort to be proactive in providing information to the public and to continue the communication among TRW, the city, and the agencies. In addition to the public availability sessions, the department was represented at city council meetings to address municipal well operation and the health effects of TCE exposure.

- 4.) The final remedy was proposed based upon the data collected in the corrective action process, composed of the RCRA Facility Assessment (RFA), RFI, four interim measure plans and the

corrective measures study. It is the opinion of EPA and the department that adequate information has been collected and developed to select an appropriate remedy to clean up the contamination.

Per the response to comment above, the final remedy will not be changed.

#### **Comment #4**

##### **Mailed in Comment dated May 16, 2000:**

*"I would like to be added to the list of the responses that are going to be made to the questions that were asked or submitted at the meeting Thursday 5/11/2000 [Availability Session]. Also, I would like to inform you there are two private wells in the city limits that provide water for several residents; one on North Service Road and one on West Service Road. The City never ran water to these areas when they were annexed several years ago. City engineer Richard Ramstein will know where these wells are located.*

*Question Attached"*

##### **Agency Response to Comment #4:**

These two private wells appear to fall outside the range that we are currently attributing to TRW; however, both well locations have been passed along to the HWP's Superfund Section for potential future sampling as part of the Oak Grove Village investigation. City of Sullivan representatives will be contacted to verify their location. If you have any questions regarding the Superfund investigation, please contact Candy McGhee, at (573) 751-1738.

#### **Comment #5**

##### **Mailed in Comment dated May 16, 2000:**

*"I enjoyed talking to you on May 11<sup>th</sup> 2000, concerning TRW Statement of Basis. You informed me during the meeting that you had posted information concerning this matter in the notice section of the local paper for several weeks. I believe that the majority of the Sullivan citizens did not learn about this problem until May 26<sup>th</sup> 2000, to study the issues and request in writing a public hearing otherwise it would be assumed that the citizens were content and satisfied with the Statement of Basis. In my opinion I feel it is unjust that the various government agencies have had many years to study this problem and yet the citizens are expected to review the volumes of information and request a public hearing by May 26<sup>th</sup>, 2000. I hereby formally request that the citizens of Sullivan be given at least a 60-day extension from the May 26<sup>th</sup> deadline to study the Statement of Basis and related information in order to formulate any questions they may have after which a public hearing needs to be held. There must be enough copies available so any citizen who so desires can research this problem and be ready with questions and alternative solutions during the public hearing. I believe that the location for these resources and the time, date and location of the public hearing need to be posted on the front page of the Sullivan Independent newspaper and not in the notice section which is in the last few pages of the paper."*

##### **Agency Response to Comment #5:**

As set forth in the response to comment #4 above, the public period was set in accordance with EPA guidance and consistent with all other corrective action processes at facilities in Missouri. An extension of the 45-day period was granted to the July 7, 2000, date and encompassed the requested public hearing. The agencies attempted to ease the burden of review by providing a public availability session during that timeframe to graphically present data and make project managers available for discussion/questions.

#### **Comment #6**

##### **Facsimile/Mailed in Comment dated May 16, 2000:**

From: Fidelity Communications Company.

The agency response will be in bold print and will address Fidelity's comments as they occur in their comment letter.

*"The following is the comment of Fidelity Communications Company to the statement of basis ("Statement") for the proposed corrective measures for the former TRW, Inc., site with respect to groundwater located under Sullivan, MO.*

*Fidelity is a major land owner in Sullivan, MO. As such it is expected that much of the groundwater under its property is contaminated by the contaminants of concern including TCE, 1,2-DCE, 1,2-DCA, lead and chromium. It is further expected that the conditions under Fidelity's property similar to the conditions of other land owners in the area and therefore, the concerns expressed by Fidelity will likely mirror those of many other Sullivan land owners.*

*There are a number of issues raised by the Statement which concern Fidelity.*

*First, the Statement's assertion that "it was determined that TRW's historical excavation activities directed at a contaminant source area has adequately removed surficial soils and sediment that were above the SAL." The Statement later states that "the remedy will include installation of an on-site, intermediate depth recovery well designed to control the plume in the intermediate zone." Because of the level of contamination in the area, a question remains as to whether or not the contaminants remain in the soils, particularly underneath the building located on the former TRW property. If this is the case, this ongoing treatment of the groundwater will be required for as long as the contamination exists in the soils. Therefore, the remedy should at least consider some further remediation of the soil underneath the facility through some alternative strategies.*

#### **Agency Response to Comment #6:**

Determining the extent and concentration of contamination remaining in on-site soils and assessing the possibility of a continuing source of contaminants to the underlying groundwater is one of many primary goals when conducting and presenting an RFI report. The following discussion is based upon the information in the RFI Report from Section 2 Environmental Setting (pages 5-14), Section 3 Field Investigations (pages 16-32), Section 5 Contamination Characterization (pages 56-64; 76-82) Section 7 Protection Standards (pages 92-93) and Section 8 Potential Human Receptors (pages 95-130).

Information about soil excavation activities at the TRW site, specifically the removal of soils associated with the Lagoon Area and the Burn Material Deposit Area, were initially submitted to the department in a report titled "Closure Report for Sullivan Works Wastewater Treatment Lagoons for Ramsey Piston Ring Division" dated January 23, 1986. As part of these activities, TRW had taken numerous soil borings to define the extent of impacted soils at the facility, had excavated these soils and had collected composite confirmatory samples from the base of the excavations to verify the removal. At the Lagoon Area, 480,000 gallons of pumpable sludge was removed and sent to the Indiana Liquid Waste Disposal at Indianapolis, Indiana, a permitted hazardous waste treatment facility. In addition, approximately 8,400 tons of sludge and soil mixed with sludge was disposed of at the Peoria Disposal Companies (PDC) of Peoria, Illinois, a permitted hazardous waste disposal facility. The contaminants associated with these areas were chromium, hexavalent chrome, lead and barium. All of the excavated areas were back-filled with clean, off-site fill.

At the Plating Operations Area, the chrome plating building was completely dismantled, and underlying soils were excavated up to a maximum of 30 feet in depth. This material was shipped to PDC of Illinois and J.Z. Disposal of Wright City, Missouri. Other removal activities included a 30,000-gallon fuel oil underground storage tank and adjacent impacted soils. Confirmatory samples were collected from the bottom of the excavations to verify that impacted soils were sufficiently removed. These activities occurred in June 1986. The contaminants associated with these areas were chromium, hexavalent chrome, lead, barium and hydrocarbons (used oil tank). All of the excavated areas were back-filled with clean, off-site fill.

Total soil borings associated with these activities from the time period 1983-1986 numbered 48 soil borings with multiple samples collected from each boring.

In 1991, TRW drilled 11 additional soil borings to characterize potential soil source areas in locations based upon groundwater data collected from on-site monitoring wells installed in 1990, which indicated the presence of TCE in groundwater underlying the facility. These soil samples were analyzed for VOCs, oil and grease, priority pollutant metals, including hexavalent chrome, total petroleum hydrocarbons and toxicity characteristics leaching procedures (TCLP) for metals. In addition, select samples were analyzed for pesticides/polychlorinated biphenols (PCBs) and semivolatile organic compounds; although no historical data indicated that the TRW-Ramsey facility ever used them.

In 1993, the agencies became involved with site assessment through the issuance of the federal administrative order. TRW developed the RFI Work Plan under EPA and department oversight. In this work plan, six units/areas were targeted for additional sampling. They were the Lagoon Area; Drum Storage Area; Material Burn Area; Burn Material Deposition Areas; Plating Operations Area (now a parking lot) and the TCE and Mineral Spirits Storage Area. One of the targeted goals of this plan was to determine the extent of remaining impacted soils, the concentrations of contaminants in these soils, and an assessment of the risk these soils posed to anyone. To address this requirement, TRW drilled 18 additional soil borings and one 130-foot deep soil boring. The location of all soil boring can be located in figures contained in the RFI Report and the Interim Measures Report titled "Surface Impoundment Soils Report."

All soil samples collected in 1991, 1993 and 1994 were below the Soil Action Levels (SALs) presented in the administrative order. These action levels are 60 parts per million (ppm) for

TCE, 400 ppm for hexavalent chrome and 4,000 ppm for barium. The SALs are based upon risk-based principles similar in nature to those used to develop drinking water MCLs. All other on-site contaminants for which no action levels were listed (lead, trivalent chromium, 1,2-DCE, 1,2-DCA) are compared to other health based guidance documents typically used in corrective action projects, such as EPA's Risk Based Concentration (RBC) tables.

Each soil boring produced multiple soil samples that were analyzed based upon field screening indicators at the various depths. The soil borings were drilled through the clean fill brought in during the activities conducted in 1983-1986, and into underlying residual soils where samples were collected in an effort to determine the vertical and horizontal extent of TCE and other facility related contaminants.

A deep soil boring was drilled as part of the RFI activities that extended down approximately 150 feet to the ground water table and collected soil samples every ten feet. The purpose of this boring was to present a profile of any TCE in the soils at depth and attempt to determine whether TCE at this depth is behaving as a dense, non-aqueous phase liquid (DNAPL). The results of the soil boring did indicate TCE was detectable in soils throughout the soil column, but at very low concentrations, with no concentrations being above 1 ppm (SAL for TCE is 400 ppm). No evidence of DNAPL was noted in this soil boring log. The location of this soil boring was situated overlying the highest groundwater TCE concentrations adjacent to the Drum Storage Area and the former TRW building. This location is indicated in figures within the RFI Report.

In conclusion, based upon this array of soil sampling activities, historical excavation work and risk based soil evaluation, the agencies determined that on-site soils are not a significant continued source of TCE to the groundwater and do not pose a risk to human health or the environment. Soil sampling was not conducted under the TRW building itself, but there were no indications of TCE use/storage in a subsurface manner (piping, vats, etc.) that would allow direct leakage under the building. Soil borings collected directly adjacent to the building did not indicate subsurface soils were impacted above (or even approaching) any health based limits. The exact source of the TCE release is unknown; as no historical interviews or information could confirm the exact nature of the release(s). The TCE releases most likely originated from the TCE/Mineral Spirits Storage Area and/or the Drum Storage Area and were allowed to drain perhaps toward the on-site lagoons and/or Winsel Creek.

The agencies, in an effort to prevent/minimize any contribution to groundwater contamination from precipitation infiltration through underlying soil, required TRW to properly grade the site to promote surface water run-off and capped the majority of the areas with a clay cap. The department will oversee maintenance of these capped areas as part of TRW's post-closure care plan. The former TRW facility has a deed restriction in place as part of these post-closure requirements, which demarcates all former hazardous waste handling areas and places property use restrictions on the property. This information is in the chain of title for the property.

*Second, it is the position of the Agencies, at page 10 of the Statement that "the City can be subject to enforcement actions based upon levels of contamination in the municipal drinking water." If, in fact, the City can be liable for a problem it did not cause, the obvious question is whether other landowners may also be subject to some remediation obligation in the event TRW would be unable to fund this remediation.*

### **Agency Response #6 (Continued):**

The City of Sullivan is liable because of its ownership and operation of the municipal water supply wells, which fall under the regulation of the State's Safe Drinking Water Law. These regulations apply to any public water supplier, defined as either servicing at least 25 people or providing 15 services connections, and being in operation at least 60 days out of the year. The department's PDWP does not regulate private well owners who do not fall within the above definition.

*Third, the Agencies concede that "the effectiveness of the proposed remedy is difficult to predict." Fidelity is concerned that this proposed remediation plan will not work, particularly in light of the expectation that the MCL standards will not be attained for at least thirty years. Therefore, it would be prudent to perform some additional studies and examine other alternatives prior to implementing a remediation strategy which may never be obtained. If an outcome is difficult to predict due to the factors relating to the geology located under Sullivan, then further information must be obtained. If, however, the Agency is satisfied the studies are adequate, then the Statement of Basis should include, or the citizens of Sullivan must be provided, information which would be easy for them to understand as to why this thirty year risk should be taken and why all studies have been adequate.*

### **Agency Response #6 (Continued):**

For historical perspective, it should be realized that this facility operated over a period in excess of 30 years. Over this timeframe, waste handling operations included the handling of TCE and the production of reportedly 160,000 gallons per day of process wastewater containing chromium, lead and barium. This volume of wastewater was introduced directly into Winsel Creek until 1964 when settling lagoons were installed on site. This process continued into the 1980s, at which point the agencies were notified of lagoon draining and excavation activities. The point of this discussion is to indicate that, although TRW historically made efforts to prevent releases, this facility introduced significant volumes of waste to its on-site soils and the adjacent surface water stream over many years. These releases allowed significant downward migration of these contaminants to the subsurface. Stabilization, clean-up and remediation of such a site is extremely daunting, with little or no assurances of success no matter how much information you have. As detailed in the RFI Report, subsurface geology is complex and karstic in nature, having faulted and fractured bedrock in addition to an extensive system of void spaces that are unpredictable, allow conduit flow and are impossible to map in their entirety.

The depth to the shallowest groundwater is approximately 150 feet below ground, with additional hydrostratigraphic zones monitored at even deeper depths of 325 and 550 feet below ground. Groundwater at these depths is difficult to remediate and is further complicated since groundwater at these deeper depths is directly effected by the pumping rates of nearby municipal wells, changing flow gradients based upon individual well operation times. Even with the agencies' knowledge and experience with remediation systems and site clean-ups, in addition to the extensive knowledge provided by TRW and its consultants, there is no one option which would present a relatively quick and certain outcome for removing such widespread TCE contamination from the aquifer. Therefore, the primary goals of the final remedy were source removal at the site and minimizing the risk to human health in the City of Sullivan. The plans associated with this remedy that were put in place for protection of human health will continue as

long as the City of Sullivan utilizes a municipal groundwater supply system. At this time, no one is drinking water with TCE contamination at 5 ppb or greater which is attributed to a release from the TRW facility. The remedy is designed to ensure that continues to be the case.

*Fourth, the Statement's Summary indicates, the proposal "limits further migration of contaminants into uncontaminated portions of the aquifer." Because private wells exist within this contaminated plume of groundwater, it seems to be somewhat inconsistent to argue that this is protective of human health and the environment when the possibility exists that contamination may ultimately migrate to uncontaminated portions of the aquifer.*

#### **Agency Response #6 (Continued):**

As a general rule, contamination will indeed continue to migrate through an aquifer as long as there is a sufficient source to drive it and groundwater gradients to induce spreading. Currently, there is TCE at depths of 325 and 550 feet below surface that originated from releases at the former TRW site. Groundwater at these depths appears to be in the zones of the aquifer that are drawn upon by city owned and operated municipal wells. The contaminants being pulled towards these municipal wells cannot be controlled by recovery wells without negating the City of Sullivan's municipal water supply system. The City of Sullivan needs this water supply system to exist as a municipality, and shutdown of this system is not an alternative. Therefore, treatment of water at the city-owned municipal well heads to reduce contamination to below health-based levels (MCLs) is a primary goal of the proposed remedy while continued source control of contaminants under the site is undertaken to limit and/or prevent additional contaminants from entering the municipal well field.

The statement that private wells are within the plume does not appear to be an accurate statement. The only private wells that the agencies are aware of that are contaminated are located far north of I-44 along Highway AF and well to the north east in the Oak Grove Village area, significantly away from the contaminant plume defined around the former TRW facility. Any private wells located near the monitored plume are sampled in accordance with the GMP and fall under the provisions of the DWCP if contamination is detected above the action levels. If the agencies become aware of contaminated private wells that are not attributable to TRW's contaminant plume, the owners are still consulted with by agency representatives and assisted by the Superfund Section, as applicable. In addition, any newly discovered private wells that are in the area of the TRW plume may be added by the agencies to the sampling requirements contained in the GMP and the protective contingencies of the DWCP. However, no private wells exist close to the current monitored plume, primarily due to City Of Sullivan ordinances, which do not allow private well installation in the city limits (unless specific approval by the city is granted).

*Fifth, there is nothing in the Statement of Basis which assures that TRW will be able to finance these corrective measures. In fact, as the Summary indicates, the costs will be determined at a "later date and the final financial assurances will also be considered in the Missouri Corrective Measures Implementation Order on Consent." There is nothing to guarantee or assure that this chosen remedy will be financed. The question naturally arises then as to what burden will be placed on the taxpayers of the City of Sullivan.*

#### **Agency Response #6 (Continued):**



It is correct that no final remedy costs or financial assurance calculations were included in the Statement of Basis, since they have yet to be determined, as the proposed remedy is still in draft and could be modified by comments received during the comment period. Once the RTC is complete, an administrative order will be drafted and issued to TRW, which will contain all the requirements of the remedy, including a compliance schedule for calculation of final remedy cost. This itemized cost calculation will be presented to the agencies for evaluation and, following approval, TRW will obtain financial assurance for that amount in accordance with 10-CSR 25-7.264 and 7.265. Some of the available financial assurance mechanisms include a financial test, corporate guarantee, or issuance of a bond, which is the current mechanism for the post-closure care cost associated with surficial upkeep of the former on-site impoundments area. Thus, none of the calculated costs associated with the state-issued administrative order will be passed along to the City of Sullivan or its residents. These financial assurance options are consistent with other financial mechanisms used at other corrective action facilities in Missouri.

*Finally, the statement that the “proposed remedy consists of what MDNR and EPA believe” will work hardly instills confidence in the citizens of Sullivan, particularly when the Statement of Basis, by its own admission, states that it will be difficult to predict the outcomes. In light of the long-term operation of this proposed remedy, it would seem to be prudent to fund such additional studies as may be necessary, to eliminate to the extent possible, any uncertainty which may exist. At a minimum, further explanation to the citizens would be appropriate as to the level of confidence the Agencies have that the groundwater will be remediated and the cost of the remediation will be fully funded. Now is not the time to risk being wrong to the detriment of the citizens of Sullivan, many of whom are employees of Fidelity.*

#### **Agency Response to Comment #6 (Continued):**

As discussed in responses to previous comments, the clean-up of releases from the former TRW facility is a daunting task and factors such as depth to groundwater, subsurface geology, extent of contamination and the continued viability of the City of Sullivan’s municipal well field all contribute to the complexity and uncertainties involved. The subsurface karstic geology of the Sullivan area alone precludes the ability to totally assure any results based upon the varied and unpredictable subsurface geologic structure associated with it. It is not practical for EPA and the department to require unending, cost prohibitive continued studies to define every subsurface void, fault and crack in the area of the release. For all these reasons, the agencies have decided to move forward with a remedy that prioritizes the minimization of exposure to contaminated groundwater. This remedy is designed to address the unknowns associated with the project by containing contingencies to protect water supply users if contamination spreads to other wells. The remedy also implements source control/recovery as much as is possible given the water supply demands of the City.

*Because Fidelity has not had the benefit of having its own consultant review the various studies, it is unable to address the technical aspects of the investigation more fully. It does reserve all its rights to address its concerns as issues arise. We appreciate the Agencies efforts, as well as the opportunity to participate in this process.*

#### **Agency Response #6 (Conclusion):**

The final remedy will be selected after consideration of the currently submitted comments. There will not be additional comment periods.

**Comment #7:**

**Mailed in Comment dated June 28, 2000:**

*After reviewing the available information at the Sullivan library concerning the TRW Statement of Basis I feel that the citizens of Sullivan should not be subjected to, or expected to drink water that is contaminated due to the 30 years of operations by TRW. I feel that the air stripping operation should continue to clean the water and that water be submitted into the city sewer system. In addition, if any other wells become contaminated in the future then stripping operations should begin for those wells also. As far as our drinking water goes the Statement of Basis suggests that the proposed groundwater cleanup standard should be the Maximum Contaminant Level (MCL) as set forth in the National Primary Drinking Water Standards. I believe that the goal for our water supply has to be the Maximum Contaminant Level Goal (MCLG) as set forth in the National Primary Drinking Water Standards. To achieve this goal I feel that TRW needs to be required to pay for all cost related to drilling new wells to replace any contaminated wells. This would include the testing and purchasing of land outside of the foreseeable contamination area, the cost of the wells and required equipment to pump the water to the residents, and continuous monitoring to make sure that the new wells remain uncontaminated.*

**Agency Response to Comment #7:**

Attached to the above letter was a series of questions, comments and suggestions. These will be addressed one at a time following the below response to the cover letter.

As stated in this response to comments, the MCLs for drinking water are enforced by the state of Missouri and applied to all municipalities across Missouri. These MCLs are the maximum permissible level at which contaminants in water may be introduced into a water supply system for the purpose of ingestion and are determined based upon health studies extrapolating the risk associated with ingestion over a lifetime of consumption. As set forth within the National Primary Drinking Water Regulations, MCLGs are not enforceable levels, as opposed to the enforceable MCLs. In the case of TCE, the MCLG is 0 ppb (non-detect), as is the MCLG for all volatile organic chemicals determined to be carcinogenic. MCLG's are unenforceable as a treatment standard due to the burdensome economics and the technical infeasibility associated with such low or non-detect levels. Typically, an alternative level is determined, such as an MCL or Treatment Technique. The air-stripping treatment technology being employed at Municipal Well No. 2 will achieve high removal efficiencies between 90% and 99% for TCE. Any future systems installed in accordance with the DWCP will be the same type of treatment system.

The City of Sullivan needs the volume of water supplied by the Ozark aquifer to exist as a municipality. The City of Sullivan has had many problem-solving sessions with department staff regarding new municipal well locations or switching to a surface water source. However, water supply is problematic in the region based upon the complex and varied subsurface geology and hydrogeology; the current municipal well locations; the nearby river locations; property access issues and the nearly unpredictable presence of TCE contamination throughout Sullivan. For

instance, the Oak Grove Village municipal well consistently has TCE contamination in it at concentrations greater than the closest municipal well to the former TRW facility. In addition, other contaminants not associated with TRW's historical operations have been detected in the Oak Grove Village well, which firmly supports the assertion that there are other sources of contamination in the Sullivan/Oak Grove Village vicinity. Any well located in this broad area would have no assurances of being free of contamination, and installation of these supply wells is an expensive proposition with no guarantees of water yield or quality.

All of these factors contributed to the agencies' decision that treatment of water supplied by current City of Sullivan municipal wells to below health-based levels (MCLs) is the most feasible remedy alternative, in combination with source removal at the former TRW facility. Given the foregoing, the elimination of any exposure scenarios above health-based limits is the primary goal of the remedy. The agencies feel this is our most prudent and consistent approach.

**Attached Questions:**

***Will the "final solution" allow the Sullivan residence [sic] to be blood tested at the hospital or doctors office of their choice at the expense of TRW/Ramsey Corp.?***

**Agency Response #7 (Continued):**

No, responsibility for funding of blood testing is not written into the final remedy. Based upon the data collected during the corrective action process assessing releases from the former TRW facility, there does not appear to be a current exposure to Sullivan residents above any health-based limits in soil, sediment, surface water and groundwater. Groundwater is impacted above health-based limits, but any exposure has been extremely limited to a very short term due to the contingency plan being in-place since 1993 under the federal consent order and the cooperation of the City of Sullivan. Data collected in 1993 from City of Sullivan municipal wells showed no TCE detections except Municipal Well No. 2 at 0.7 ppb and Municipal Well No. 8 at 0.6 ppb; both levels being well below the 5 ppb health-based limit. In December 1997, Municipal Well No. 8 went above 5 ppb and was immediately taken off-line by the City of Sullivan. In June 1999, Municipal Well No. 2 went above 5 ppb and was similarly taken off-line by the City of Sullivan. Based upon this data, there does not appear to be an exposure warranting blood testing of Sullivan residents.

***Will the "final solution" limit tort liability for possible suits against TRW/Ramsey Corp. by city residence [sic] or the City of Sullivan in years to come?***

**Agency Response #7 (Continued):**

This is a legal question that you will need to address to your own attorney. We are not able to provide you legal advice.

***Has OSHA been advised of the toxic areas at the old Ramsey Corp. site?***

**Agency Response #7 (Continued):**

The agencies have not notified OSHA. Ace Manufacturing and Rokwell Industries have been historically informed of the previous activities at the former TRW facility, but based upon current data, no known hazards exist at the surface of the site. As indicated by extensive sampling activities, the excavation activities conducted in the 1980s have removed all grossly impacted soils and sediment from the site. Groundwater beneath the facility is impacted above health-based limits and is the primary threat of exposure. For informational purposes, the Occupational Safety and Health Administration (OSHA) has set an exposure limit of 100 parts of TCE per million parts of air (100 ppm) for an eight-hour workday, 40-hour work week.

***Has any independent corporation (beside Ramsey Corp.) tested the 41 well sites?***

**Agency Response #7 (Continued):**

TRW is aware that the department may request split samples at any time during the quarterly sampling activities carried out by TRW's consultant. During these activities, the department collects its own samples at the same time as TRW and returns the samples to the department's Environmental Services Program laboratory for analysis. These split-sampling activities are normally conducted at the request of the Hazardous Waste Program when doing groundwater monitoring system compliance evaluations. For the TRW project, the Environmental Services Program split groundwater samples on December 12 and 21, 1995, and on March 29, 2001. All split samples collected fell within an acceptable range of differential and no deficiencies were noted with TRW's selected laboratory.

***What is the maximum depth of Sullivan's deepest well?***

**Agency Response #7 (Continued):** The deepest City of Sullivan municipal well is No. 10, which is 1840 feet deep. This well is cased down 400 feet below ground surface. Pump depth is 525 feet below ground surface. This well produces 220 gallons per minute (gpm). TCE has not been detected in this well.

For informational purposes, the next deepest City of Sullivan municipal well is No. 8, which is 964 feet deep. This well is cased down 532 feet below ground surface. Pump depth is 400 feet below ground surface. This well produces 165 gpm. Municipal Well No. 8 is currently off-line with historical TCE detections as high as 11 ppb. A treatment system is currently in the process of being installed and optimized to remove TCE.

For more information on the Sullivan municipal supply system, including contaminant source information the department has gathered, you are encouraged to visit <http://maps.cares.missouri.edu/cgi-bin/swipmaps.plx>.

***What have other cities/communities done to correct or counter the effects of these contaminants? Has any community implemented the final proposed solutions and what has the outcome been?***

**Agency Response #7 (Continued):**

Volatile organic compounds such as TCE are very common contaminants found at industrial facilities. TCE has been found in at least 852 of the 1,430 National Priorities List (NPL) sites

identified by the EPA. Treatment of VOC-contaminated water varies, but the most accepted and efficient treatment technologies for removal of TCE from water is air stripping.

There are many sites in Missouri that are using air-stripping technology to treat groundwater impacted by VOCs in both groundwater monitoring wells, and to a lesser degree, groundwater municipal supply wells. No Missouri sites or communities currently pump water specifically treating TCE into a community water supply, although it is a common occurrence in other states.

A primary source of information regarding site cleanups may be found at EPA's Superfund webpage, located at <http://www.epa.gov/superfund>.

Some other directly applicable webpages include:

**Error! Bookmark not defined.** - This web site details treatment of TCE-contaminated groundwater at a Superfund site located in Republic, Missouri.

**Error! Bookmark not defined.** - This web site details treatment of TCE-contaminated groundwater at the Valley Park TCE site in St. Louis, Missouri.

**Error! Bookmark not defined.** - This web site details treatment of TCE-contaminated groundwater at a Superfund site located in Olean, New York. This community has similar circumstances to that currently experienced by the City of Sullivan and has several impacted municipal wells that are treating TCE to the 5 ppb MCL prior to introducing the water into the public water supply for use.

A number of other web sites not associated with the EPA homepage can be found by using any internet web search engine using keywords such as trichloroethylene, groundwater cleanup, municipal water supply, remediation, record of decision (ROD), RCRA final remedy, etc.

***Why is Sullivan City, EPA, and the MDNR proposing to put the city wells back on line once the toxicity levels fall below 5 ppm, when long term exposures of these levels can still cause cancer and other related problems?***

#### **Agency Response #7 (Continued):**

The standards and rationale for the MCL of 5 ppb for TCE have been discussed previously in the response to this comment and in the response to comment #1, questions 3, 4, 5 and 17. Some additional information can be found at the following U.S. EPA web sites:

<http://www.epa.gov/safewater/standard/setting.html> and  
<http://www.epa.gov/safewater/wot/ontap.html>.

***What was the date that the City of Sullivan, TRW/Ramsey Corp., the EPA and MDNR were first made aware that there was a problem with these toxins that were contaminating the residence water supply and this company site?***

#### **Agency Response #7 (Continued):**

Based upon historical regulatory records, the agencies first became aware that soils at the facility were significantly impacted in 1985 during lagoon excavation activities. The agencies initiated an RFA at the TRW facility starting on December 28, 1989. During the RFA process, TRW voluntarily had their consultants, Moore & Associates, install four groundwater monitoring wells screening the upper-most aquifer directly underlying the site in March 1990. Data from these wells indicated the presence of TCE and related degradation products and inorganic constituents consisting primarily of chromium, lead and barium. In 1991, TRW initiated additional site investigations that were summarized in a Phase I Work Plan and submitted to the agencies for review and approval. This work set out in the workplan included the installation of eight additional groundwater monitoring wells and additional soil borings. The data from this investigation was submitted to the agencies in a report dated June 24, 1992, and confirmed the contamination of underlying groundwater. Within this report, TRW recommended Phase II investigation activities. The agencies completed the RFA on September 14, 1992. Based upon the findings presented in the RFA, the EPA entered into an Administrative Order on Consent on April 1, 1993, with TRW and the property owners at that time. The federally issued

administrative order set forth the requirements for four interim measure plans (SISR, GMP, DWCP, P&TP), the Description of Current Conditions Report (DCCR), the RFI Work Plan, the RFI Summary Report and the CMS Report.

***Comment:***

***I would suggest that an independent consulting company be brought in to oversee the testing of the water and soil. These parties would have no direct or financial ties to MDNR, EPA, TRW/Ramsey Corp. or the City of Sullivan, thus eliminating any conflict of interest.***

**Agency Response #7 (Continued):**

Consistent with all other facility clean-ups in Missouri, the U.S. EPA and Department of Natural Resources' primary goal is protection of human health and the environment. The approach utilized for this site remains consistent with all other sites in Missouri and U.S. EPA Region VII, as does the amount of split sampling conducted by the regulating agencies. The lab used by TRW provides laboratory data quality assurance testing that does not show errors or modified data. The split sampling conducted by the agencies, in addition to sampling conducted by the City of Sullivan (on its municipal wells), consistently generate data that is well within the expected margin of error when sampling for contaminants at such low levels as 1 ppb. While the agencies would have no objections to a third party conducting sampling and analysis using another laboratory (provided it was properly certified), there does not appear to be the justification to have this in the final remedy. The agencies will continue to split samples with TRW as discussed in the response to comment #1, question 13. If sampling data now or in the future indicate errors that present doubt as to the validity of data, TRW will contract with another laboratory for sample analyses, and follow-up inquiries by the agencies will be made regarding the reasons for any inaccurate data generation and analyses.

***All of the final solutions are lacking in my opinion. We cannot allow the clean-up process to take 30 years.***

**Agency Response #7 (Continued):**

As discussed in previous comments, this lengthy timeframe is based upon the agencies' experience in similar projects in which restoration of an underlying aquifer does indeed take 30 years or longer. This length of time for completion of the remedy is compounded by the additional complexities associated with this site, and the agencies are aware of no "quick fixes" for this magnitude of a cleanup. The simple and unfortunate fact is that, given current technology, groundwater cleanups take a long time.

***Suggestions:***

***My final solution would request that the old well sites be taken off line. New wells away from the contaminated area to be dug and put on line. Or water be transported in or pipelined in from other non affected communities.***

### **Agency Response #7 (Continued):**

A high-volume water supply that is capable of meeting the long-term needs of a community the size of Sullivan is very expensive to develop and challenging to maintain. The City of Sullivan has considered a number of options, including the possibility of importing water from outside of the area. Geologic conditions and the uncertainty of groundwater quality in areas outside of the city add to the complexity of the decision. Sullivan's ultimate selection of a water-supply alternative will likely depend on several factors, including the initial cost for developing the raw supply; the need for water treatment; the complexity and cost of treatment, if it is required; the firm yield of the system, and other factors.

By treating groundwater to below all applicable MCLs, as set forth in the Missouri drinking water standards, TRW can return the groundwater to potable use. The conditions contained within the final remedy will not limit the City of Sullivan's ability to choose or alter its water supply system, nor does it release TRW from responsibility if the current groundwater system is abandoned.

As to bottled water, it is the department's experience that using bottled or bulk tank water to replace water supply systems containing contamination above an MCL is an adequate short-term solution. However, the situation that the City of Sullivan is in should not be defined as a short-term water supply problem, and using bottled water is not an efficient long-term solution as communities generally find this alternative burdensome over a long period of time.

***There may be buried debris in the soil at the former Ramsey Corp. site that could be adding to the toxins. I would suggest that we bring in an independent company that could do ground radar mapping to determine if the above to be true.***

### **Agency Response #7 (Continued):**

As detailed in the response to comment #6, extensive soil excavation activities took place at the facility in the mid-1980s. During these activities, much debris (piston ring parts, bricks, wood) was encountered and excavated. Interviews with plant personnel identified those areas as various materials burning areas. These areas were excavated to approximately six to eight feet of depth and targeted as Solid Waste Management Units to be investigated in the RFI. Soil samples were collected throughout the entire area, and although debris parts were found in soil borings, no soil samples approached any health-based limits for the contaminants. There is no evidence which suggests that buried drums are at this site. Groundwater monitoring of the shallow zone indicates TCE concentrations generally decreasing over time or remaining the same, further supporting that there is no continuing TCE source feeding the groundwater from subsurface soils. Therefore, ground-penetrating radar (GPR) was not selected as a site evaluation tool, based upon this knowledge and the limitations of that geophysical tool (relatively shallow depth of survey, residual moisture content in soils, underlying subsurface strata).

***If the final solution does not address the situation in its entirety, the City of Sullivan, its residence [sic], the MDNR, Missouri State and Missouri Baptist Hospital – Sullivan will be financially responsible for increased cost of the clean up and subsequent healthcare costs.***



### **Agency Response #7 (Continued):**

Cleanup costs for site contaminants that were released from the TRW facility will be paid for by TRW. The state issued order will contain financial assurance mechanisms to ensure payment by TRW for the calculated amount of costs needed to implement the final remedy, including long-term operation and maintenance of treatment units on city-owned municipal water supply wells.

*We the city residence [sic] need to enlist the assistance of our senators, congressmen, Channel 4 – “4 On Your Side”, and other media entities.*

### **Agency Response #7 (Continued):**

As is departmental policy, the notification of the public availability session and public hearing was sent to all nearby state of Missouri District Senators and Representatives. At previous public availability sessions, the notification were also sent to U.S. Senators Christopher S. Bond and John C. Ashcroft and U.S. Representatives Jo Ann Emerson and Kenny Hulshof.

### **Comment #8:**

#### **Public Hearing Verbal Comments Received June 29, 2000**

Summarized below is the discussion presented by the speakers during the June 29, 2000, public hearing. A copy of the public hearing transcript is attached to this RTC document. Any comments by the speakers are addressed by the agencies in the following responses.

- **Speaker #1: representing City of Sullivan (summarized)**  
Speaker #1 indicated that the City of Sullivan would be submitting their comments on the Statement of Basis to the agencies in written format before the July 7, 2000, deadline. The city's comments were received and are addressed in the agencies' response to comment #10.
- **Speaker #2: (summarized)**  
Speaker #2 verbally communicated his concerns associated with a community dealing with a contaminated water supply and recited the questions contained on the 21-question sheet that was given to the agencies during the public availability session. These questions are addressed in the response to comment #1 of this RTC document.
- **Speaker #3: (summarized)**  
Speaker #3 verbally communicated his concerns associated with contamination detected in his private well and stated his recommendation that TRW take responsibility for it. The agencies have spoken at length with this gentleman over the past several years and understand his concerns. However, there currently is no evidence to connect releases from the former TRW site to his private well, thus preventing the agencies from requiring further action by TRW. At the time contaminants were detected in his private well above the health-based limits, the agencies arranged for representatives from the Department of Health to speak with him about any potential health risks associated with long-term use of

TCE-contaminated water and attempted to present some in-home treatment options. Currently, the department's Superfund Section is assisting Speaker #3 as part of the Oak Grove Village investigation and is evaluating alternatives.

- **Speaker #4: representing TRW (summarized)**

Speaker #4 verbally summarized the history of the TRW facility and detailed the extent of investigations and interim measures activities currently ongoing to address groundwater contamination.

- **Speaker #5: representing City of Sullivan**

Speaker #5 asked the following four questions to be addressed by the agencies:

**Question:** "I would like to ask, first of all, what relevance the comments by the representative of TRW have in relation to the adequacy of our aquifer to the Statement of Basis and any final remedy?"

**Agency Response:** This is a question directed at TRW. There will be no aquifer pumping restrictions other than the MCL water quality requirement associated with the final remedy.

**Question:** "I would also like to ask whether the TRW monitoring process at present in being will be extended to Well No. 6 which will shortly come on line?"

**Agency Response:** TRW will continue to monitor the municipal wells as set forth under the GMP. The agencies are aware of the activation of Municipal Well No. 6 and it will be monitored as required.

**Question:** "Thirdly, I would like to inquire of EPA and DNR whether there are any existing or past comparable situations in other parts of either the state or the country which might indicate a precedent for appropriate remedies and actions by those regulatory authorities, and if they – if there are some which have been addressed and dealt with by DNR and/or EPA, can they be made available and studied prior to the any final remedy being addressed in the Statement of Basis?"

**Agency Response:** Currently, there are no other communities in Missouri facing quite the same situation as the City of Sullivan presently is. As previously discussed in the response to comment #7, there are no communities in Missouri where reintroduction of water specifically treated for TCE is occurring. There are numerous occasions of treatment at municipal supply wells prior to pumping to a wastewater treatment plant. Outside of Missouri, numerous municipalities treat groundwater for TCE to the MCL and reintroduce the treated water into the water supply system. These projects have been reviewed by agency staff prior to and during the structuring of the Statement of Basis and final remedy selection process. For more information on these sites, some web site links are provided in the response to comment #7.

**Question:** "Lastly, I would inquire what specific financial requirements will be imposed on TRW in terms of a trust fund, bonding, or similar to satisfy current and future treatment of contaminated water in the city of Sullivan's existing well system and any future wells deemed necessary to service the city's ongoing water supply needs?"

**Agency Response:** As previously discussed in the response to comment #6, there will be financial assurance requirement as part of the final remedy to insure its implementation in the event TRW becomes unable to fulfill these obligations. Some typical financial assurance mechanisms include a financial test, corporate guarantee, or a bond. Remedy implementation costs will be calculated as part of the state-issued order for remedy implementation. This calculation will include lifetime operation and maintenance of treatment units on municipal water supply wells, including the ability to add costs based upon any future triggering of the DWCP on private or municipal wells. This calculation will also be based upon ongoing operation and maintenance of the on-site groundwater treatment system, ongoing groundwater monitoring activities and any additional well installation activities.

- **Speaker #6: (summarized)**

Speaker #6 verbally communicated his concerns regarding the importance of providing safe water to the citizens of Sullivan.

**Agency Response:** The agencies have the same concern for the City of Sullivan water supply issue. The agencies have had numerous meetings with city officials over the past seven years to listen to the city's needs and provide a final remedy within the bounds of the law that is protective of human health and the environment.

- **Speaker #7: (summarized)**

Speaker #7 read a comment letter that he had submitted to the agencies during the public comment period. This comment letter is responded to previously in the response to comments.

**Comment #9:**

**Public Hearing Comment Forms dated June 29, 2000**

“Juergens Mobile Home Park is who I work for. Our water has shown up with TCE. We are adjacent to the landfill on Emma Lane. David Mosby told me they are not testing (TRW) for TCE at landfill. Also their wells are only 175-220 feet deep. I want TRW to test for TCE and to drill wells at a level equal to ours next to the landfill and also test them for TCE. I also think TRW should not be allowed to test their own samples they should be sent to an independent lab. Maybe they wouldn't falsify a sample but testing their own samples would certainly leave the door open to that! They also should provide us an alternative water source should we need one.”

**Agency Response to Comment #9:**

The TCE detected in Juergens Mobile Home Park's supply wells is not from releases from the former TRW facility, as based upon our available data. The department's Superfund Section conducted the investigation of the Sullivan landfill site and several potentially responsible parties associated with that site, of which TRW was one. Given the proximity of the landfill to these private wells, this comment was passed along to the Superfund Section and additional sampling of the Juergens' water supply wells was conducted as part of the Oak Grove Village Superfund investigation. Any questions or comments associated with that project should be directed to Candy McGhee, at (573) 751-1738.

**Comment #10:**  
**Mailed in Comment dated July 5, 2000**

From: The City of Sullivan

The City of Sullivan's comment letter is typed in italics below. The agency response will be in bold print and will address the City of Sullivan's comments as they occur in their comment letter. The City of Sullivan also submitted to the department as part of their public comments a ground water model conducted by Barr Engineering titled Evaluation of Intermediate and Deep Zone Groundwater Flow at Sullivan, Missouri.

*On April 12<sup>th</sup>, the Environmental Protection Agency (EPA) and the Missouri Department of Natural Resources (the department) proposed in their Statement of Basis a final groundwater remedy for the TRW-Ramsey facility. In their announcement of the availability session to discuss the Statement of Basis, the agencies indicated that in addition to agency and TRW representatives, City of Sullivan officials would be "available to answer any questions during the availability session," thereby suggesting that the City of Sullivan was supporting the proposed remedy. The City, however, strongly opposes the remedy as proposed, and equally as strongly objects to being included in the group of parties supporting this remedy. Both EPA and MDNR have been aware of the City's opposition to the proposed remedy.*

*This letter is intended to discuss the City of Sullivan's concerns about the adequacy of the groundwater and source investigation as well as the adequacy of the final remedy proposed in the Statement of Basis for the above-referenced facility. This letter is also intended to present new information to EPA and to MDNR which will allow the agencies to determine that the TRW-Ramsey Facility is a source of the contamination of the City's drinking water wells.*

*Background*

*The City of Sullivan obtains drinking water for approximately 6,500 residents solely from groundwater pumped from nine city wells. Seven of these nine city wells are presently contaminated with trichloroethylene (TCE). TCE has been detected on a regular basis in wells No. 2, No. 7, No. 8, No. 9, and No. 11. Because of TCE contamination above health-based levels, the City had to shut down city wells No. 2 and 8. Well No. 11 is the City's new drinking water well, which was installed and paid for by the City. TCE has also been found in city well No. 3 and most recently in city well No. 5.*

*Between approximately 1950 and 1984, TRW operated a facility which manufactured automobile piston rings in the City of Sullivan. During a time period ranging from approximately 1950 to 1984, TRW generated daily approximately 160,000 gallons of TCE-containing waste water which TRW discharged directly onto the ground. To date, based on the RCRA facility investigation (RFI), MDNR has been able to attribute the TCE contamination of city wells No. 2 and No. 8 to TRW's disposal practices. The RFI was conducted by TRW and found TCE contamination as high as 46,000 ppb in the shallow groundwater and concentrations as high as 1,300 ppb in the intermediate groundwater zone with one sample from a deep zone well with a concentration of 130 ppb TCE.*

*To control human exposure to TCE contamination and to contain and prevent further migration of TCE in groundwater, TRW with approval by MDNR has conducted certain*

*corrective action activities intended as an interim approach to address the TCE contamination. In particular, TRW has installed two shallow recovery wells intended to contain the TCE contaminated groundwater located underneath the TRW facility and has proposed to construct two treatment systems for two of the seven contaminated city wells. The proposed treatment systems use different technologies. The treatment of city well No. 2 is based on an air-stripping method which has been demonstrated to remove 95% to 99% of the TCE in groundwater at many other sites, while the other technology intended to be used for well No. 8 has been approved on a trial basis for a one-year demonstration period to determine if it can remove 75% of the TCE contained in the groundwater. TRW in its corrective measure study (CMS) has recommended to implement these interim measures as the final remedy. In their Statement of Basis, EPA and MDNR propose in essence the same interim approach advocated by TRW as the final remedy, except that the agencies have added an additional recovery well in the intermediate groundwater zone to contain the contaminated groundwater plume.*

#### **Agency Response to Comment #10:**

**Based upon groundwater data contained in the records of the department's PDWP (submitted to the department by the City of Sullivan) and the quarterly sampling conducted by TRW, the city's assessment above does not appear to accurately reflect the state of TCE contamination in City of Sullivan municipal wells. Of the ten City of Sullivan municipal wells, TCE has indeed been detected in seven of the ten wells. However, TCE is not detected regularly in all seven of these wells; and the term "presently contaminated" should really only be applied to five of these water supply wells (Municipal Well Nos. 2, 7, 8, 9 and 11). The data referenced below goes back to May of 1993.**

**Of these five municipal wells, two have gone above the MCL (Well Nos. 2 and 8) and are both being addressed by TRW under the DWCP. Of the remaining three wells with consistent TCE detection, we provide the following information:**

- **Municipal Well No. 7 intermittently has TCE detected in it, with the highest concentration being 1.4 ppb in a sample collected November 22, 1999. Since that analysis, that well has been non-detect for TCE during all sampling conducted by TRW and City of Sullivan as part of their quarterly monitoring in the year 2000.**
- **Municipal Well No. 9 consistently has between .5 and 3.1 ppb of TCE detected in samples collected by both the city and TRW. The most recent samples at the time of this response to comments has the concentration at 0.8 ppb (collected by the city on November 21, 2000) and 1.2 ppb (collected by TRW in December 2000).**
- **Municipal Well No. 11 has had increasing TCE contamination detected over the past six months. The most recent samples at the time of this response to comments has the concentration ranging from 3.0 ppb to as high as 4.7 ppb in samples collected between November 2000 and January 2001. The latest data indicated contamination in the 3-3.9 ppb concentration.**

**For TRW to implement the DWCP for these supply wells, the TCE concentration would have to go above 5 ppb, and a determination would have been made by the agencies that TCE contamination in these wells originated from the former TRW facility. Of these three**

wells, Municipal Well No. 11 appears to be the closest to the former facility and is located to the north. Municipal Well No. 7 is located to the east. Municipal Well No. 9 is located northeast from the facility and is the furthest away, being located in the vicinity of Oak Grove Village.

The remaining two municipal wells that the city defines as “presently contaminated” are Nos. 3 and 5. It is unclear to us what sampling data the city is referencing when making the statement that TCE has “most recently” been detected in Municipal Well No. 5. Agency data indicates TCE has been detected just once in this well at a concentration of 0.2 ppb in a sample collected by TRW in June 1997. All quarterly sampling conducted by TRW and the sampling data (collected by the city), which is submitted to the PDWP, indicate non-detect for all samples collected at Municipal Well No. 5 both prior to and following TRW’s one-time sample in June 1997. Municipal Well No. 3 has had TCE detected in it twice over the past seven years. These concentrations were 0.17 ppb in June 1997, and 0.59 ppb in June 1998, and both samples were collected by TRW. All TRW sampling prior to and following these two events have been non-detect. All data submitted to the PDWP by the city for Municipal Well No. 3 has been non-detect for TCE.

Regarding historical TRW/Ramsey facility operation, we should also clarify that the 160,000 gallons per day of wastewater generated by TRW was from the chrome plating operation. According to historical facility operating information, the chrome plating operation was not directly related to the operations in which TCE was used. Therefore, it is unsubstantiated to label this wastewater as “TCE-containing,” although it is likely that this wastewater did have some concentrations of TCE present in it based on surface impoundment soils data. As derived from underlying groundwater contamination, it appears the TCE storage building is most likely the primary source of TCE releases.

#### *Summary of Comments*

*The City is very concerned about its ability to protect the health of its citizens because at the present time seven out of nine city wells are contaminated with TCE. Even though the contamination of the groundwater has been investigated for some time, the City is concerned that the RFI conducted by TRW has not adequately and fully defined the lateral and vertical extent of the groundwater contamination as required under the consent order TRW signed in 1993. The addition of one shallow monitoring well to replace a dry well and one additional intermediate zone monitoring well as proposed in the Statement of Basis are not sufficient “to determine fully the nature and extent of any release of hazardous waste or hazardous constituents at or from the [former] TRW facility.” Id. at 4. TRW discontinued the groundwater investigation before a determination could be made that the contamination in the groundwater had been fully defined. No clean wells were required to define the limits of the groundwater plume. Therefore, the investigation conducted to date does not satisfy the purpose of the consent order. Further, the investigation is inadequate considering the complexities of karst geology and groundwater hydrogeology in this setting.*

*The groundwater data obtained by TRW are neither adequate nor reliable. Therefore, these data cannot be used to define the lateral and vertical extent of the TCE plume. The RFI conducted by TRW has not satisfied a fundamental requirement of the RCRA program “the collection of environmental data that are of adequate and documented quality to support*

*[Agency] decision making.” Quality Assurance Project Plans for RCRA Groundwater Monitoring and Corrective Action Activities, Memorandum from Sylvia Lowrance, Director of the Office of Solid Waste, at [sic] (1993). Only data of such “adequate and documented quality” can provide a basis for an appropriate decision on the final remedy for this facility. Id.*

*The City is concerned that the final remedy proposed by EPA and MDNR will not adequately protect the health of its citizens as required by the provisions of the Resource Conservation and Recovery Act (RCRA). In essence, TRW proposes as final remedy the interim cleanup approach started a few years ago. This approach consists of a very limited pump and treat system which is not capable of containing the contaminated groundwater plume nor of preventing offsite migration. The interim groundwater cleanup also includes two proposed treatment systems treating groundwater in only two of the seven contaminated city wells and using different treatment approaches. While this groundwater cleanup approach may have been adequate as an interim measure, it is inadequate as a final remedy because it does not clean up the groundwater nor does it provide a safe and reliable drinking water source for the citizens of Sullivan. The City requests that MDNR consider a remedy which would provide for an alternative drinking water supply for the citizens of the City of Sullivan. The City proposes using the Meramec River as an alternate drinking water source, as it would provide safe and sufficient drinking water to the citizens of this City.*

*As part of the interim measures, TRW was required to prepare and implement a Drinking Water Contingency Plan (DWCP). This plan does not adequately protect the health of the citizens of the City of Sullivan because it allows for consumption of drinking water with TCE levels above the health-based maximum contaminant level (MCL) for more than two months before any remedial action is taken. Further, the sampling frequency of the city wells is inadequate.*

*To date, MDNR has only been able to attribute the contamination of two city wells to past TRW disposal practices. The City strongly believes that the source investigation conducted by TRW and MDNR to date has been inadequate as the quality and quantity of groundwater monitoring and hydrogeologic characterization activities have been insufficient. Additional investigation as conducted by the City should allow EPA and MDNR to attribute the contamination of additional wells to the TRW facility.*

*We are concerned that the opportunity provided to the public to date to participate in the corrective action decision making process has neither been adequate nor meaningful as the public was not provided with the opportunity to comment on the adequacy of the interim measures, the RCRA facility investigation (RFI) report, and the corrective measures study (CMS) conducted by TRW. This opportunity for public participation is required by EPA regulation and guidance. At a meeting on December 8, 1999, the City requested that the administrative record for the corrective action at the TRW facility be updated because since 1993 no new documents had been added to the administrative record available to our citizens in the City of Sullivan’s library. MDNR then agreed to update the record as soon as possible. However, the record was not updated until on or about April 12, 2000, the date of the release of the Statement of Basis. The City strongly objects to this lack of opportunity for the public to participate in the corrective action decision process.*

*MDNR and EPA previously indicated a willingness to review new information generated by the City to determine if such new information would support a different approach to the remediation of the TCE contamination. The City hereby requests a serious review and reconsideration of decisions made regarding the groundwater and source investigation and the final corrective action based on new information obtained by the City. The City's findings are reflected in a document entitled "Evaluation of Intermediate and Deep Zone Groundwater Flow." (Copy attached.) This evaluation indicates that the TRW facility is a source of the contamination of the City wells.*

### ***Discussion***

*1. Adequacy and completeness of the definition of the lateral and vertical extent of the TCE plume.*

*(a) Lateral extent-shallow zone.*

*Water level data from TRW monitoring wells indicate that the groundwater flow in the shallow groundwater zone is from the southwest and southeast to the north. In this direction all the monitoring wells except one have shown concentrations of TCE above the MCL. The monitoring well farthest downgradient is monitoring well OBG-20S, which has not shown detectible concentrations of TCE. However, the static water level in this well is so low that there is less than 1.5 feet of saturation at the bottom of the well. This level of saturation is insufficient to obtain a reliable groundwater sample. Further, it is inappropriate to compare data from well OBG-20S with data obtained from wells with higher levels of saturation.*

*It is likely that higher TCE concentration levels are present underneath the screen of well OBG-20S. A deeper shallow-zone monitoring well should be installed at the location of well OBG-20S to verify that the lateral extent of TCE contamination in the shallow zone downgradient of the TRW facility has been fully delineated. Further, the TRW groundwater monitoring plan requires that a new well be installed when an existing well becomes dry which based on the above-discussed water saturation level in OBG-20S has occurred. The City requested a few months ago that a monitoring well in the deeper shallow zone be installed to more fully define the lateral extent of TCE contamination in the shallow groundwater zone. EPA and MDNR propose the installation of such a well and the City agrees with this proposal. Statement of Basis at 7. [sic]*

### **Agency Response #10 (continued):**

**The lateral extent of TCE in the shallow zone of the Ozark Aquifer is discussed in depth in the agencies' response to comment #1, questions #1, 9 and 10. As part of the remedy, OBG-20S will be replaced by TRW at a deeper depth.**

*(b) Lateral extent-intermediate zone.*



*Water level data from TRW monitoring wells indicate that the groundwater flow in the intermediate zone is to the east and northeast across the TRW facility. All intermediate-zone monitoring wells northeast which are downgradient of the TRW facility have detectible levels of TCE. There are no monitoring wells in the intermediate zone downgradient of the TRW facility that do not show contamination by TCE. As no “clean” wells downgradient of the TRW facility exist at the present time, the lateral extent of the TCE contamination in the intermediate zone groundwater has not been defined. The City requests that TRW be required to install wells farther out in the intermediate zone until it can establish the appropriate number of “clean” wells in that zone. The Statement of Basis only proposes the installation of one intermediate depth well, which is inadequate to establish the extent of TCE contamination in the intermediate zone. Id.*

**Agency Response #10 (continued):**

**The lateral extent of TCE in the intermediate zone of the Ozark Aquifer is discussed in depth in the agencies’ response to comment #1, question #9. The monitoring wells referenced by the city have had minor concentrations of TCE in them, ranging from <1 ppb (non detect) to 3 ppb. However, the RFI is delineating TCE contamination that is above the action level, which is 5 ppb. Consistent with monitoring at other corrective action sites in Missouri, as long as the monitoring wells do not show an increase in TCE concentrations approaching the 5 ppb action level, they are deemed to be perimeter monitoring wells. If concentrations of TCE are detected at the action level, TRW will be required to further step-out with the installation of additional monitoring well(s).**

*(c) Lateral extent-deep zone.*

- (1) Water level data from monitoring wells indicate that the groundwater flow in the deep zone groundwater is to the northeast across the TRW facility. Deep zone monitoring well OBG-1DD showed TCE concentrations of 130 ug/L in 1999. Municipal well No. 7 is farther east of OBG-1DD and has had detectible levels of TCE. Therefore, due to the absence of a “clean” well east or northeast of OBG-1DD, the horizontal extent of TCE contamination in the deep groundwater zone east of the TRW facility has not been delineated. No provision for the installation of such “clean” wells is made in the Statement of Basis. The City requests that such wells be installed.*
- (2) Municipal well No. 8 is south of the facility and has shown TCE concentrations above the MCL. However, there are no deep zone monitoring wells south of the TRW facility. Due to the absence of any clean deep zone monitoring wells south of the TRW facility, the extent of TCE contamination in the deep groundwater zone south of the TRW facility has not been defined fully. As the Statement of*

*Basis does not propose such wells, we request that deep zone monitoring wells be installed.*

**Agency Response #10 (continued):**

The lateral extent of TCE in the deep zone of the Ozark Aquifer is discussed in depth in the agencies' response to comment #1, question #9. For informational purposes, during the quarterly monitoring conducted in the year 2000, the concentrations of TCE in the on-site 550 foot monitoring well (OBG-1DD) fell to the 37-57 ppb range. No other off-site deep series monitoring wells located downgradient of the site to the north and the northeast have detected TCE above 1 ppb. Barr Engineering's (who was employed as a consultant by the city) groundwater model report also supports the evaluation that flow is to the north-northeast, thereby suggesting that the deep series wells currently in place would be optimal for detecting any TCE plume at the 550 foot depth. Given this information, an additional deep series well to the east was not pursued during the RFI activities. Regarding a deep series well to the south, OBG-14DD is located immediately south-southwest of the former TRW facility and is non-detect for TCE.

*(d) Vertical extent.*

- (1) The deepest monitoring well below the TRW site is OBG-1DD. The TCE concentration in this well is 130 ug/L which is 26 times higher than the MCL for TCE.*
- (2) The TCE concentration in deep well OBG-1DD at the TRW facility has increased from 23 ug/L to 130 ug/L during the first half of 1999. This has occurred within a time period of about six months and indicates that the TCE contamination is reaching the deeper groundwater zone. Again, no "clean" well exists to fully define the extent of the TCE plume in the deep groundwater, and no such well is proposed in the Statement of Basis. However, such a well must be installed to define the TCE plume in the deep groundwater.*
- (3) Concentrations of TCE in the groundwater at the TRW facility have been as high as 4.6% of the solubility limit as recently as March 1999. Concentrations of 1 to 10% of solubility are deemed by EPA indicative of the presence of DNAPL. If such DNAPL is present, the concentrations of TCE in deep wells under the facility can be expected to increase. This is occurring already as reflected by the analytical results obtained so far and discussed above. The depth of contamination, therefore, is likely to increase from year to year. Because there are no "clean" deep wells under the TRW facility, the extent of the vertical contamination of TCE could be considerably deeper than the available data indicate. "Clean" deep wells must be installed to determine fully the depth of contamination and whether the contamination has reached the Davis formation, which would indicate deeper regional aquifers*

*contaminated with TCE. These aquifers are drinking water sources.*

**Agency Response #10 (continued):**

The vertical extent of TCE in the deep zone of the Ozark Aquifer is discussed in depth in the agencies' response to comment #1, question #9, including the rationale as to why a deeper well was not required. Also as previously stated, the latest concentrations of TCE in OBG-1DD are in the 37-57 ppb range.

Regarding the potential presence of TCE in DNAPL form underlying the former TRW facility, the highest historical concentrations of TCE detected in the upper aquifer was 51,000 ppb (which is approximately 5.1% of the TCE solubility value). As part of RFI activities, a deep soil boring was advanced from the ground surface through the vadose zone to the top of the water table in the area of highest groundwater TCE concentrations. The purpose of this soil boring was to identify any residual TCE in DNAPL form in underlying soils. The results of this soil boring are presented in the RFI Report and did not indicate the presence of DNAPL in soils. TCE concentrations were detected in the soils, but none exceeded (or even approached) any health-based limit. A detailed discussion of the RFI soil sampling activities is located in Agency Response to Comment #6. TCE concentrations in groundwater have generally remained the same or decreased in the shallow zone of the aquifer, while concentrations have increased somewhat in intermediate depth wells. This could be indicative of TCE contamination having already begun vertical migration into the intermediate zone prior to shallow zone recovery well installation. Given this information, there is no indication that this is a DNAPL site.

*(e) Sampling frequency.*

*Most monitoring and water supply wells are sampled much less frequently than quarterly. This level of frequency is insufficient to document the temporal fluctuations in TCE concentrations and is not consistent with the monitoring plan approved by MDNR.*

**Agency Response #10 (continued):**

Well sampling frequency for all wells (monitoring, municipal and private) was on a quarterly basis and started in May 1993. In accordance with the GMP and based on analytical results to date, the sampling frequency for selected wells that did not exhibit significant temporal fluctuations was reduced to a semi-annual basis. Wells that exhibited temporal fluctuations or that were strategically located to monitor the potential migration of the TCE plume will remain on a quarterly sampling schedule. The sampling frequencies of all wells will be re-evaluated as part of the updating of the GMP as required in the state-issued order. All municipal wells, regardless of historical non-detection for TCE, will be sampled on a quarterly basis in the updated GMP. In addition, all sampling frequencies may be modified by the agencies as necessary under the provisions of the GMP.

*(f) Concentrations of TCE in active municipal wells and in monitoring wells.*

*Concentration of TCE in active municipal wells with open-hole intervals of several hundred feet are compared to concentrations of TCE in monitoring wells without accounting for the dilution effect in municipal wells. If a monitoring well nest were installed adjacent to some of the municipal wells, it is likely that substantial exceedences of the MCL for TCE would be found. We request that such monitoring well nests be installed to determine the true TCE concentrations.*

*The existing well nest configuration monitors less than ten percent of the total saturated thickness of the intermediate and deep zone groundwater at a given location. This configuration provides an opportunity for TCE to migrate undetected past the well nest through over 90 percent of the aquifer thickness. Serious consideration should be given to adding more wells to each well nest or installing single bore hole multiport samplers at each location.*

**Agency Response #10 (Continued):**

**The agencies acknowledge that TCE in municipal wells is diluted and not indicative of TCE concentrations being introduced into the well from select geologic strata/formations, thereby producing different data than a monitoring well would. However, municipal wells do act as boundaries of groundwater flow, and regardless of how much higher the actual isolated TCE concentration is coming out of the surrounding geologic formation, that TCE is not advancing past the zone of capture of the active municipal well. The groundwater modeling conducted by Barr Engineering and submitted by the city supports this assertion. Given this information, additional monitoring wells to determine TCE plume movement in the vicinity of municipal wells do not seem necessary, unless a given municipal well is inactive for a significant period of time.**

**(g) Conclusion.**

*Because, the groundwater data obtained by TRW are neither adequate nor reliable, these data cannot be used to define the lateral and vertical extent of the TCE plume in the groundwater. Neither can these data provide a basis for an appropriate decision on the final remedy for this facility that would protect the health of the citizens of the City of Sullivan. Any final remedy decision is premature, as the extent of the contamination remains undefined. The Statement of Basis recognizes that the contamination needs to be further defined by stating that: “[i]f contaminant levels are detected in these new monitoring wells at or above the groundwater cleanup/protection standards set forth in the CMI consent order, TRW will be required to further step out in a continued northerly direction and install additional monitoring wells in the respective brownwater zones until [sic] extent of contamination is defined.” Id. at 7 and 8. We request that additional data as discussed in the recent “Evaluation of Intermediate and Deep Zone Groundwater Flow” be obtained in order to adequately define the nature and extent of contamination. Id. at 43-45.*

**Agency Response #10 (continued):**

There appears to be no reason advanced by the City as to why the data collected by TRW is “neither adequate nor reliable.” The data that has been collected by TRW throughout the corrective action process has been in accordance with the associated work plans and the Quality Assurance Project Plan (QAPP), all of which have been reviewed and approved by the agencies. Any data that is submitted to the agencies includes quality assurance testing from the laboratory of choice. Additional discussion on the issue of quality assurance of investigation data may be found in Agency Response to Comment #7.

2. *Adequacy of source investigation.*

(a) *No delineation of capture zones of municipal wells.*

*No investigation was undertaken regarding the manner in which pumping the municipal wells affect groundwater flow direction. Neither were the effects of pumping new wells, i.e., well No. 11, on groundwater flow evaluated. Given the aquifer parameters that were calculated by TRW’s consultant from data collected during the August 1993 pumping test of well No. 2, it appeared likely that groundwater levels in the intermediate and deep zones at the TRW site change with variations in the pumping rate of any one of the City’s nine wells. Pumping the City’s wells substantially affects groundwater flow directions from the TRW Site and the migration pathways of contaminants. The number, location, and pumping rate of the City’s wells have changed substantially over the past 50 years, as new wells were installed and old wells were abandoned. Each change in pumping causes a change in the direction of groundwater flow.*

*To date, neither TRW nor the agencies have made any attempts to collect data and perform analyses to determine how pumping the City’s wells affect groundwater flow and contaminant migration, even though pumping the City’s wells determine to a large extent, by TRW’s own admission, the groundwater flow in the Sullivan area. The intermediate and deep groundwater zones are dominated by diffusive flow and, as such, are very amenable to groundwater flow modeling. A groundwater flow model, calibrated to a variety of pumping conditions, can be used to evaluate past and present groundwater flow directions and identify sources of contamination. We have implemented such a model and have reached the following conclusions:*

1. *Groundwater has likely migrated in the intermediate and/or deep groundwater zones from beneath the lagoons at the TRW site to the City of Sullivan wells No. 2, No. 3, No. 9, No. 10, and No. 11, as well as into the Oak Grove Village well at some time between 1961 and 1999.*
2. *Based on the groundwater flow conditions evaluated in our study, TCE detected in City wells No. 2, No. 3, No. 9, No. 10, and No. 11, as well as in the Oak Grove Village well likely originated underneath the former lagoons at the TRW site and*

*migrated through the intermediate and deep groundwater zones underneath the former lagoons at the TRW site to the municipal wells*

**Agency Response #10 (continued):**

**One of the goals of the RFI was to delineate the horizontal and vertical extent of site-related contaminants in the groundwater. This goal was accomplished by the installation of monitoring wells and a study of the effects that the closest and most directly down-gradient municipal well (No. 2) to the site would have on underlying groundwater. To determine this impact, a 48-hour pumping test on Municipal Well No. 2 was conducted, which indicated a diffuse-flow system that did influence hydraulic head in monitoring wells at the facility. This information supported the distribution of the TCE plume as defined by the surrounding monitoring wells.**

**Regarding the groundwater model referenced above, the agencies have received and reviewed the report/model titled “Evaluation of Intermediate and Deep Zone Groundwater Flow at Sullivan, Missouri,” which was submitted by the City of Sullivan.**

**As with any model, there are limitations and uncertainties associated with its use, and all parties should be aware that the tracer used in this model in no way simulates TCE fate and transport in groundwater. None of the sorption, dispersivity or biodegradation characteristics of TCE in the subsurface are taken into account by the model; therefore, making the identification of any target wells, as set forth by the city in the previous text, both speculative and unsupported. However, the model does provide groundwater draw-down measurements taken from municipal and monitoring wells that shows the hydraulic heads in the intermediate and deep groundwater zones respond to changes in pumping at municipal wells. This information will be used by the agencies when making determinations of responsibility during implementation of the DWCP.**

*(b) Installation of monitoring wells at source areas.*

*No monitoring wells were installed adjacent to the bed of the tributary to Winsel Creek where 160,000 gallons of TCE-contaminated wastewater were discharged daily for approximately 30 years. Only soil and sediment samples were taken of the stream bed. Such samples did not exhibit TCE contamination, which is to be expected due to the quick volatilization of TCE. TRW failed to sample the groundwater underneath the soil and sediment and therefore failed to define a potential major source of contamination.*

**Agency Response #10 (continued):**

**In evaluating whether Winsel Creek is a contributing source to underlying soils and groundwater, a monitoring well (OBG-15S) was installed located adjacent to the creek approximately 300 feet downstream of the former TRW site. The TCE concentration in this well has historically been at 47 ppb in April 1993, and has since been below the detection limit. This data supports the theorized release originating from the area of the former TCE storage building and as supported by concentrations in monitoring wells**

approaching Winsel Creek (OBG-16S, OBG-5S, OBG-3S and OBG-4S). This spatial distribution of TCE concentrations does not support a separate source of TCE underlying (and originating from) Winsel Creek.

- (c) *Inadequate frequency of sampling of monitoring wells.*

*TRW failed to frequently sample monitoring wells during spring high water conditions to evaluate how TCE concentrations may change over short periods of time in karst terrains.*

**Agency Response #10 (continued):**

**TRW conducted quarterly groundwater sampling of every shallow, intermediate and deep groundwater monitoring wells for a period of three years, including nearby spring sampling. This sampling volume and frequency was adequate to observe and evaluate seasonal fluctuations.**

- (d) *Inadequate aquifer test performed at city well No. 2.*

*The aquifer test performed using city well No. 2 as the pumping well was not run for a sufficient duration of time. In particular, water levels were not monitored frequently enough to determine the presence of conduit flow as evidenced by step effects in the water levels of monitoring wells during the pumping phase of the aquifer test. It also appears that monitoring was not conducted to determine the background water levels before the aquifer test was performed.*

**Agency Response #10 (Continued):**

**As stated in the RFI Report, the purpose of the aquifer performance test at Municipal Well No. 2 was to evaluate the preferred groundwater flow directions, potential groundwater migration pathways, and aquifer characteristic parameters. The 48-hour duration of the pumping test on Municipal Well No. 2 was deemed sufficient by the agencies to provide the information necessary to address the above-stated goals. Groundwater elevations were measured in select monitoring wells daily for a period of one week prior to the aquifer performance test to assess background water levels. The data from this pump test compares similarly to the information presented in the groundwater model submitted to the agencies and is indicative of a diffuse flow, confined aquifer system.**

- (e) *Conclusion.*

*To date, MDNR has only been able to attribute the contamination of two city wells to past TRW disposal practices. The source investigation has been conducted almost exclusively by TRW pursuant to the RFI. This investigation has been inadequate as the quality and quantity of groundwater monitoring and hydrogeologic characterization activities have been insufficient. The City has performed a source investigation as discussed above, which has identified the TRW-Ramsey facility as a source*

*of the TCE contamination of the City's drinking water wells. Based on TRW's disposal practices and the volume of TCE disposal at the site as well as the volume of contaminated groundwater underlying the site and the direction of groundwater flow from the site, the TRW facility can be identified as a source of the contamination of the City wells. The recent "Evaluation of Intermediate and Deep Zone Groundwater Flow" confirms this determination.*

**Agency Response #10 (continued):**

**The corrective action investigation of the former TRW facility has been conducted consistent with corrective action regulations that are imposed at other facilities in the state of Missouri. The data collected and submitted by TRW in this investigation has all of the necessary quality assurance documentation to support its representative nature. The agencies do not agree that this investigation has been inadequate regarding quality and quantity of data generated. Regarding any discussion of additional source study, the department's Superfund Section is progressing with its investigation of the contaminated Oak Grove Village water supply well. If this investigation indicates that the contamination originated from releases at the former TRW facility, TRW will expand its responsibilities under the GMP and DWCP to include Oak Grove Village and any other linked wells.**

3. *Adequacy of Drinking Water Contingency Plan (DWCP).*

*The Statement of Basis proposes that the DWCP continue to be applied. Id. at 6. The DWCP is, however, inadequate to protect the health of our citizens.*

- (a) *Under the DWCP, TCE contaminated well water is treated or alternate drinking water is provided only if TCE contained in the well water exceeds the MCL for TCE by a factor of 2. Whether this level of TCE has been reached is determined by averaging the results of four sampling events. If the average thus obtained exceeds twice the MCL, remedial action is taken. If the average is less than twice the MCL, only tap sampling is conducted. Given these preconditions, the citizens of the City of Sullivan may be drinking water contaminated with TCE above the MCL for more than two months before any remedial action is taken. This situation poses an unacceptable risk to human health.*

**Agency Response #10 (continued):**

**Based upon discussions with the Missouri DOH and a review of associated risk assessment guidance and fact sheets, exposure to low concentrations of TCE for these timeframes should not present any adverse health effects. Regardless, decreasing the timeframe set forth in the DWCP will be a primary goal of the department when revising this plan as part of the state-issued order.**

- (b) *The Statement of Basis indicates that: "Any elevated contaminant level detected must be determined to be the result of contamination released by TRW's activities at the facility prior to*



*implementation of the DWCP. This determination will be made based upon information presented in the RFI in addition to any new information made available to the EPA/MDNR.” Id. at 6 and 7. Because TRW is currently not taking responsibility for*

*TCE in any municipal wells except for wells No. 2 and No. 8, implementation of the DWCP may be delayed until the source of the TCE is confirmed. This approach does not protect the health of our citizens.*

**Agency Response #10 (continued):**

**Any determination as to the source of contamination made by the agencies will be expedited as much as possible, including the notification process and discussion of determination rationale with TRW. TRW has an opportunity to argue any determination, including the option of dispute resolution as set forth in the current federal administrative order, if it disagrees with the agencies’ presented rationale. The agencies understand the importance of expediting these activities, so delays will be minimized as much as possible. The agencies will also continue open communication with the City of Sullivan, keeping city staff informed so that they can be prepared for any decisions affecting the city’s water supply.**

- (c) *A tap sampling program allows for extensive dilution of water from a contaminated well. Water from all the City of Sullivan’s municipal wells are blended together in the distribution system. Therefore, a well could continue to supply water with concentrations of TCE above the MCL without triggering the application of the contingency plan. Moreover, the contaminated well can continue to supply TCE to the entire water supply system during the interim.*

**Agency Response #10 (continued):**

**The agencies’ stance on the tap sampling program is discussed in the previous two agency responses to this comment. It should be noted that, if dilution is indeed occurring in the water supply system such that water is not above 5 ppb of TCE at the tap, then an exposure is not occurring.**

- (d) *The DWCP requires that municipal and private wells be sampled on a quarterly basis. However, monitoring data indicate that many municipal wells are being sampled only on an annual basis.*

**Agency Response #10 (continued):**

**TRW conducted quarterly groundwater sampling of every shallow, intermediate and deep groundwater monitoring wells for a period of three years, including city-owned municipal wells and nearby spring sampling. In accordance with the GMP, the frequency of well sampling could then be reduced based upon the data gathered over this time period. Any decreases in frequency of sampling were based upon the lack of TCE concentrations in a well, or the well being an interior plume well in which TCE concentrations do not appear**

to be rapidly fluctuating. As to the sampling frequency of municipal wells, it will be a goal of the department to increase sampling frequency at all municipal wells to quarterly when revising the GMP as part of the state-issued order.

(e) *Conclusion.*

*The drinking water contingency plan as implemented by TRW does not adequately protect the health of the citizens of the City of Sullivan because it allows for consumption of drinking water with TCE levels above the health-based MCL. Further, the sampling frequency of the city wells is inadequate. And, most importantly, the implementation of the DWCP may be delayed until EPA and MDNR believe that they can conclusively prove that TRW is the source of the contamination unless the City assumes the financial burden of addressing contamination it did not cause. The City's financial ability is limited, however. For the DWCP to be an effective component of the proposed remedy the agencies must investigate the source of the groundwater contamination and not rely on the RFI prepared by TRW.*

**Agency Response #10 (continued):**

**All issues brought forth by the City have been discussed in the previous responses, please see above.**

4. *Adequacy of final remedy.*

*The City is concerned that the final remedy recommended by TRW and proposed by EPA and MDNR at this time will not adequately protect the health of our citizens. In essence, EPA and MDNR propose as final remedy the interim cleanup approach approved by MDNR a few years ago. One component of this approach is to continue the present pump and treat system. The Statement of Basis proposes merely the addition of one intermediate groundwater zone recovery well. As evidenced by the increase in TCE concentrations in the City's drinking water wells, the system of shallow recovery wells is inadequate to contain the TCE plume or to prevent off-site migration of TCE in the shallow, intermediate, and deep groundwater zones. While this system may have been adequate as an interim approach, it is not a satisfactory final remedy. The addition of an intermediate recovery well does not make this proposed remedy acceptable to the City as the pumping rate and anticipated volume of 200 gpm are based on assumptions, not on study and analysis of concrete data. In fact, past experience with local geology would indicate constant water production of only about 20 gpm. If the volume of recovered water is small, this containment approach will not be effective, and contaminated groundwater will continue to migrate to City wells.*

*The proposed intermediate zone recovery well presents another more serious problem. The transmissivity of the intermediate zone is very low and pumping will induce much higher vertical gradients than currently exist in the vicinity of the source areas at the TRW site. These higher vertical gradients substantially*

*increase the potential for high concentrations of TCE in the shallow zone to migrate faster into the intermediate zone. Unless the intermediate well has very high capacities (which is unlikely), much of the induced leakage will escape capture by the recovery well. The end result will be to pull high concentrations of TCE down into the groundwater zones currently being used by the City's municipal wells thereby aggravating the contamination problem.*

**Agency Response #10 (continued):**

**We should clarify that the shallow recovery well system that was designed and put in-place as an interim measure was not designed for plume containment, but rather for source reduction. Based upon data collected in the RFI, the lateral movement of TCE in the shallow zone is driven primarily by naturally occurring groundwater gradients and does not appear to be hydraulically connected to the underlying intermediate and deep zones of the Ozark Aquifer. Groundwater in the intermediate zone; however is directly affected by the pumping of municipal wells, and plume control at this depth is a targeted goal of the final remedy. We understand that any intermediate recovery well(s) installed will not “out pull” the groundwater gradients associated with Municipal Well No. 2 (when in operation); however, an attempt must be made to control and extract the highest concentrations of TCE at this depth. The agencies are also aware that an intermediate depth recovery well could indeed increase vertical gradients. A design goal of the recovery system will be the capture of any TCE drawdown from the shallow zone. The agencies will closely monitor any subsequent TCE plume fluctuations and will pursue the increased sampling frequencies for all monitoring wells to quarterly for a two-year period at the time of installing the intermediate zone recovery wells. If the intermediate zone recovery system does aggravate the contamination problem in nearby municipal wells, or appears to be spreading the TCE plume at a greater rate, the department will evaluate the need to modify the remedy based upon this changing situation.**

**The agencies appreciate the information provided by the City regarding the subsurface hydrogeology of the target formation. If indeed the 200 gpm extraction rate is not attainable, additional subsurface wells will be evaluated as part of the final remedy. The evaluation for any additional intermediate depth recovery well will primarily be based on the attained pumping rate and the goal of not interfering with Municipal Well No. 2 as a water supply well. This approach will be set forth in the state-issued order as a condition of the Corrective Measures Implementation Work Plan.**

*Another component of the contemplated final remedy is the treatment of city wells which under the DWCP is required only if the level of TCE concentration in the well water exceeds twice the MCL for TCE. At the present time, the treatment is limited only to two wells even though seven out of nine wells are contaminated. No provision is made to expand the treatment to additional city wells. This limited approach is apparently favored by EPA and MDNR because to date the agencies have only been able to attribute to TRW the contamination of city Wells No. 2 and 8 even though TRW for more than a decade discharged 160,000 gallons of TCE-containing waste water directly onto the ground. Not only in the treatment of the City's contaminated drinking water wells inadequate because it is limited to two contaminated wells only, but the treatment approach advocated by TRW if also inadequate.*

*The approach approved by MDNR on an interim basis allows for different technologies to be used for wells No. 2 and 8. One of the technologies may only allow for a 75% reduction in TCE contamination in the well water and will initially be employed on a trial basis. Even though the agencies state that “TRW...is currently optimizing the operational efficiency of a treatment system at municipal well No. 8 to remove TCE from the groundwater,” id. at 5, the agencies are sufficiently concerned about the effectiveness of this treatment approach because they promise that “[i]f now, or in the future, the aeration system (currently installed on municipal well No. 8) is deemed inadequate by the MDNR PDWP, MDNR HWP, or EPA, TRW will be required to design as alternative system for the affected municipal well(s) that will meet all applicable and federal treatment standards.” Id. at 7.*

*While this approach may have been adequate as an interim approach, it is inadequate as a final remedy as it does not address all the contaminated city wells. Neither does this approach address adequately the two wells subject to treatment. The City requests that MDNR select a final remedy for the TRW facility which is protective of the health of the citizens of the City of Sullivan as required by RCRA. In particular, the City requests that EPA and MDNR not allow a patchwork approach which seems to be influenced by present liability information. The City also requests that the option of an alternate drinking water supply be seriously considered as it would be protective of public health. In fact, that option has been selected at various Missouri sites with TCE groundwater contamination.*

**Agency Response #10 (continued):**

**As previously discussed in Response to Comment #1, Questions #9, #10, #11 and #12, the determination of responsibility for contamination in any given well must consider the very real possibility that an alternate TCE source or sources exist. Historical data from Oak Grove Village’s water supply well indicates not only TCE, but also tetrachloroethylene (PCE) at 16 ppb (collected December 3, 1986) and 59 ppb (collected October 26, 1986). The MCL for PCE is 5 ppb. PCE was not detected in any samples collected at the TRW facility. And although PCE is no longer showing up in samples collected from the Oak Grove Village well, this data indicates possibly multiple contaminant sources that have entered the intermediate depth portion of the Ozark Aquifer near the Oak Grove Village area. As discussed in previous comments, the department’s Superfund Section is currently investigating the Oak Grove Village area looking for the source of contamination in the Village well. We will continue to keep the public informed on the progress of that investigation by the Superfund Section by way of public availability sessions and other public outreach efforts.**

**Regarding the treatment unit approach to be applied to any newly-contaminated municipal wells whose releases are from the former TRW facility, all future systems will be the same design as that for Municipal Well No. 2. This requirement will be set forth in the state-issued order for remedy implementation.**

**Regarding the selection of an alternate drinking water source such as the Meramec River, the agencies would support this decision. However, at this time, it is beyond the authority**

of the agencies to require TRW to fund such a project. If the entire city water supply was contaminated with TCE, and a determination was made that the contamination detected in all municipal wells originated from the former TRW facility, that alternative might be a viable remedy. However, current data indicates that only two wells out of a total of ten are contaminated above the MCL. Beyond that, current data does not support the rationale that releases from the former TRW facility are so widespread as to impact the entire water system, especially given the cones of capture of operating municipal wells that the TCE would have to migrate through.

*The City requests that EPA and MDNR review carefully the comments made by the City, reconsider decisions made regarding the groundwater and source investigations and postpone a decision on the final corrective action until the nature and extent of the groundwater contamination are adequately defined and a determination of the source of contamination is made based on all available information. The City further requests that the agencies carefully evaluate the option of a permanent alternative water supply.*

*Thank you for providing us with the opportunity to comment on the Statement of Basis, and for considering our comments.*

#### **Agency Response #10 (continued):**

**The agencies appreciate the City's comments and continued assistance with the various investigations that are ongoing in the Sullivan area. Based on our review of the comments on the Statement of Basis, we do not believe we will be altering the final remedy. However, the language presented in the state-issued order for remedy implementation will have conditions contained therein to address a number of the City's concerns that are discussed in our response to the City's comments. It has been and will continue to be a priority of the agencies to listen to the public's concerns and feedback on the activities being undertaken as part of the corrective action process at the former TRW facility. We will attempt to address all issues, as we are able, under our authorities.**

#### **Comment #11:**

**Mailed in Comment dated July 7, 2000**

From: Mr. Rick Bell, TRW

TRW's comment letter is typed in italics below. The agency response will be in bold print and will address TRW's comments as they occur in their comment letter.

*TRW Inc., is submitting these comments to the Statement of Basis (SB) prepared by the Missouri Department of Natural Resources (the department) and U.S. Environmental Protection Agency (EPA) regarding the Corrective Action Program for the former TRW facility in Sullivan, Missouri. To facilitate our response, comments are provided in the same numeric format as the sections presented in the SB. If we have no comments in a particular section, it will be skipped. Please use your discretion in responding to these comments as some of them are for clarification purposes only or to respond to remarks made during subsequent Public Availability/Hearing sessions.*

## **2.0 FACILITY BACKGROUND**

*It was stated in the second paragraph that “The plant used various organic solvents and petroleum-based raw products in connection with its chrome-plating system.” However, these chemicals were used in other areas of the manufacturing plant and were not associated with the chrome-plating system. Also, based on other public comments, some clarification of the wastewater treatment and discharge from the chrome-plating system is in order. During operation of the facility between the late 1950s and 1983, TRW discharged wastewater from its chrome plating operation, which, from 1973 on, was treated and discharged through settling lagoons on site. However, these lagoons were part of a treatment process for the removal of solids from this wastewater stream prior to discharge to Winsel Creek and the effluent was fully permitted in accordance with the applicable regulations. Furthermore, there appears to be a misconception that this wastewater was laden with TCE. However, this is not the case. Although this waste stream may have contained trace concentrations of TCE from time to time, it was not directly connected in any way to areas or operations where TCE was handled or stored and so it was virtually TCE-free.*

#### **Agency Response to Comment #11:**

**The text in the statement of basis will be changed generally to reflect this description of historical operations, although there is a degree of uncertainty as to the source of TCE releases into the environment. As previously stated in this response to comments, TCE was detected in soil samples in the vicinity of the former surface impoundments, thus suggesting that TCE was present in lagoon waste water.**

#### *Nature and Extent of Contamination*

*The following explanations are provided to further clarify any potential misconceptions regarding whether the RFI has appropriately characterized the nature and extent of the contamination in accordance with the RCRA Corrective Action Process:*

- *Lateral Extent: Intermediate wells OBG-12D and OBG-18D were installed to delineate the extent of TCE concentrations to the east and northeast of the identified source area. Minor concentrations of TCE (well below the established MCL) have been detected only sporadically in these wells. Therefore, the horizontal limits in the east and northeast direction have been delineated.*

*The delineation of the horizontal extent of the TCE concentrations in the deep zone to the south of the identified source area was based on computer modeling (stochastic Monte Carlo simulation). As presented in the RFI report, conservatism assumptions were used in the design of the modeling effort and input parameters. Site-specific data were used to calibrate the model, and the future migration of the TCE plume was modeled for a 30-year time frame to provide an overly conservative estimate of the maximum TCE concentration that could potentially occur. Based on these modeling results, the TCE concentrations are limited in extent and will not extend to areas of public or private drinking water wells installed in the deep zone. Therefore, the characterization is considered to be adequate, supportive, and protective of human health.*

*Furthermore, monitoring well cluster OBG-14 was installed southwest of the former TRW facility and is located directly between the identified on-site VOC source and the City of Sullivan Well No. 8. All analytical data from the deep monitoring well (OBG-14DD), the intermediate well (OBG-14D), and the shallow well (OBG-14S) have indicated TCE concentrations to be less than the detection limit of 1 ug/L.*

**Agency Response #11 (continued):**

**As discussed in Response to Comment #1, question #9, additional intermediate depth groundwater monitoring wells will be part of the final remedy implementation. These additional intermediate depth wells will be installed north of Municipal Well No. 2 and south of monitoring well OBG-21D and will be mandated in the state-issued order for remedy implementation.**

- *Vertical Extent: Over 20 sets of ground water quality data have been collected over the past six years from OBG-1DD. Prior to the June 1999, sampling event, the average TCE concentration detected in this well was 34.6 ug/L. The vertical extent modeling completed as part of the RFI was based on a concentration of 50 ug/L. Although the TCE concentration in this well was 130 ug/L during the June 1999, sampling event, it had decreased by more than half (to 54 ug/L) during the December 1999, monitoring event. Therefore, the June 1999, data point appears to be anomalous based on all the previous data plus the more than 50% decrease in TCE concentration by the sampling event in December 1999. However, the TCE concentrations at this well will continue to be monitored in accordance with the approved GMP and this situation will be further evaluated.*

*The highest TCE concentration in any of the deep monitoring wells was 130 ug/L detected in OBG-1DD during the June 1999, ground water sampling event as discussed above. However, this concentration is well below 1% of the TCE solubility limit and, as such, it can be said that it is definitely not possible for any free-phase (DNAPL) to be present in the deep aquifer. The highest concentration of TCE detected on-site was 51,000 ug/L in shallow ground water monitoring well OBG-2S during the December 1997, sampling event, which is approximately 5.1% of the TCE solubility value. Based on this result, TRW advanced a deep soil boring from the ground surface to the top of the water table in the vicinity of OBG-2S, with the approval of the MDNR. The purpose of this soil boring was to verify that any residual TCE was well-below free-product (DNAPL) concentrations in the ground water in an area where the highest TCE contamination was known to exist. The results of this soil boring and other information presented in the RFI Report confirm that no residual free-product TCE or DNAPL materials have ever been encountered nor are they likely to exist.*

*Based on the estimates of vertical TCE contamination as presented in the RFI Report, it was shown that the TCE concentrations generally decrease by an order of magnitude with every 100 feet of depth. It was estimated in the RFI Report that the TCE concentration of 50 ug/L in OBG-1DD would decrease to 5 ug/L within 100 ft.*

*below the bottom of this well. Even if the apparent temporary increase in TCE concentration detected in OBG-1DD in June 1999, (130 ug/L) is appropriate, the vertical depth at which the TCE concentration decreases below the MCL can be calculated to occur at a depth of about 145 ft below the bottom of OBG-1DD, or at a total depth of 695 ft. Because the Potosi Dolomite occurs to a depth of approximately 840 feet below grade, it can be said with relative certainty that the TCE-impacted ground water does not extend into the lower Davis Formation.*

### *Winsel Creek*

*The first encountered ground water beneath the site and Winsel Creek (which is classified as a losing stream) is approximately 150 ft below grade. Winsel Creek is not a source area for TCE, as is demonstrated by ground water monitoring data from well OBG-15S, which was installed adjacent to Winsel Creek and less than 300 ft. northwest of the site.*

*In addition, the DGLS conducted a dye tracing investigation by placing dye in Winsel Creek along a stretch near the former TRW facility to assess potential migration pathways. Although the study could not uniquely identify the former TRW facility as the source of TCE for down gradient areas, the study did conclude that dye injected into Winsel Creek was not observed in the municipal wells in the Sullivan area. Therefore Winsel Creek is not a potential conduit for contamination of the municipal wells.*

### *Ground Water Cleanup/Protection Standards*

*According to U.S. EPA's Drinking Water and Health Fact Sheet (12/98), the U.S. EPA's Maximum Contaminant Limit (MCL) for TCE has been set at 5 mg/L because EPA believes, given present technology and resources, this is the lowest level to which water systems can reasonably be required to remove this contaminant should it occur in drinking water. While not necessarily recommended, it should also be noted that EPA/MDNR could set target cleanup goals for carcinogens at levels corresponding to higher cancer risks. For instance, it could be decided that the acceptable risk level is one in a hundred thousand and this might be equivalent to 50 mg/L of TCE. However, setting the cleanup level at the MCL of 5 mg/L for this situation in Sullivan appears to be the Applicable or Relevant and Appropriate Requirement (ARAR).*

### *Interim Remedial Measures (IRMs)*

- *Ground Water Monitoring Plan (GMP):* *In accordance with the GMP, TRW conducted quarterly ground water sampling of the shallow, intermediate, and deep ground water monitoring wells for a period of three years. This sampling frequency was adequate to evaluate the hydrogeologic conditions during the spring high water conditions. In accordance with the GMP, and based on analytical results to date and the approval of MDNR, the sampling frequency for selected monitoring wells which did not exhibit significant temporal fluctuations was reduced to a semi-annual basis. Monitoring wells that exhibited temporal fluctuations or that were strategically located to monitor the potential migration of the TCE plume, remained on a quarterly sampling basis.*



*Currently ten of the 41 monitoring wells and four of the nine active municipal water supply wells are sampled quarterly to assess temporal fluctuations in the TCE concentrations, whereas 29 of the 41 monitoring wells are sampled on a semi-annual basis. On an annual basis, the 41 monitoring wells and nine active municipal wells are sampled for VOCs to verify TCE concentrations. In accordance with the GMP, the sampling frequency for the monitoring wells will continue to be evaluated on an annual basis and if necessary, can be modified with the concurrence of the MDNR.*

**Agency Response #11 (continued):**

**As discussed in response to comment #10, the GMP will be revised in the state-issued order.**

**Targeted changes include making all municipal well sampling frequencies revert back to quarterly. The agencies deem this necessary based upon the nature and operation of municipal water supply wells and the concerns of the City of Sullivan and other commentors. Additionally, an increased sampling frequency (monthly) will be pursued at municipal wells when quarterly sampling data indicates a TCE concentration of greater than 4.0 ppb, but below the action level of 5 ppb. The agencies deem the increase is necessary given the goal of minimizing as much as possible the potential of water at greater than 5 ppb of TCE being introduced into the water supply system. The increased monitoring frequency will not be applied to municipal wells where contamination cannot be attributed to a release from the TRW facility.**

**Another targeted change to the GMP will be the requirement for a two-year period of time in which all monitoring wells will be sampled quarterly. This two-year period will begin at the time the intermediate zone recovery well(s) is completed. This increased frequency will be necessary to evaluate the potentiometric and chemical fluctuations resulting from the start of recovery activities at this depth. Following this two-year period, sampling frequency at monitoring wells will again be reassessed similar to the modification process that was established in the federal consent order.**

- *Drinking Water Contingency Plan (DWCP): Implementation of the approved DWCP by TRW has occurred on three occasions: at Homeowner Well No. 111, Municipal Well No. 8, and Municipal Well No. 2. The DWCP includes provisions for confirmatory and tap sampling programs to validate first-time samples at potable drinking water sources (e.g. homeowner or municipal wells) with TCE levels exceeding the MCL. Despite these provisions, TRW has foregone completion of the sampling programs at each of these locations, in the interest of saving time to proactively address these situations and to provide potable water at these sources as soon as practical. Although it is believed that there has been no unacceptable risk to human health from those wells, TRW voluntarily and expediently took these steps to provide potable water at Homeowner Well No. 111 and Municipal Well No. 8 due to perceived, potential health concerns from the citizens of Sullivan.*

**Agency Response #11 (continued):**

**As discussed in the response to comment #10, the DWCP will be revised under the state-issued order. Targeted changes include shortening the confirmatory sampling procedures,**

including the shortening or removal of the tap-sampling program. The agencies deem this change appropriate given the proactive attitudes of both TRW and the City of Sullivan. Another targeted change in the DWCP will be to designate the preferred treatment unit type and design that will be used when a municipal water supply well becomes contaminated above the MCL. A standardized approach will decrease the time necessary to install a treatment unit.

- *IRM Treatment Systems at Municipal Wells No. 2 and 8* – As previously noted, TRW implemented actions at Municipal Well No. 8 to provide potable water from this well. It also is in the process of addressing the situation at Municipal Well No. 2 per the DWCP.

*The SB implies that the IRM treatment system at Municipal Well No. 8 must successfully demonstrate its capabilities in reducing TCE concentrations to below the protection standard of 5 ug/L. However, it should be clarified that this system has continually demonstrated the capability to reduce the TCE concentrations in this well to below the 5.0 ug/L MCL for over 15 months.*

*In addition, with regard to the need for review and approval of these systems by the Air Pollution Control Program, we've already received a letter from this group indicating "No Permit Required" for either of the IRM treatment systems at Municipal Wells No. 8 or No. 2.*

#### **Agency Response #11 (continued):**

The department's PDWP approved the treatment system on Municipal Well No. 8 for a one-year trial basis to monitor the efficiency of the unit. The one-year trial, at the time of this response to comments, has not begun. As referenced in the Statement of Basis, if now or in the future the aeration system currently installed on Municipal Well No. 8 is inadequate, TRW will design an alternative system for that well. The agencies have closely monitored the progress of the design and operational efficiency of the treatment unit at Municipal Well No. 8.

The range of removal efficiencies being attained by this unit typically averages between 70 and 75 percent TCE removal. With a target goal of less than 5 ppb, that would limit TCE concentrations in Municipal Well No. 8 to not exceed 16.67 ppb (for 70% removal) or up to a maximum of 20 ppb (for 75% removal). Concentrations in this well were detected as high as 10 ppb by TRW in the third quarter of 2000 and were still rising until Municipal Well No. 8 was shut down. TCE concentrations have since dropped to around 1 to 2 ppb since deactivation of the well. Quarterly sampling for the PDWP collected by the City of Sullivan showed a TCE concentration of 11.5 ppb in November 22, 1999. Given that TCE concentrations when the well was active showed no indication of stabilizing, the lifetime of usefulness for this treatment system is speculative and might prove to only be a short-term solution. The system currently installed on Municipal Well No. 8 will not be installed on any other municipal wells. The DWCP will be modified such that the air-stripping treatment design is now the preferred method of treatment and will be the design of any future treatment system put in-place at City of Sullivan municipal wells if required by a state order.

- Pump and Treat (P&T) Plan: As correctly stated in the SB, the IRM treatment system constructed at the former Ramsey facility site was a source-reduction measure to address the highest concentrations of TCE in the shallow aquifer beneath the site. We would like to clarify that it was never intended to contain the TCE contaminated ground water.

#### *Post-Closure Care Plan*

*It should be updated that the post-closure activities (e.g. survey plat filing, deed restriction) are complete and the revised Post-Closure Care Plan has been approved by the agencies and is being implemented by TRW.*

#### *Other Potential VOC Sources*

*It should be noted that numerous other potential sources of VOCs exist or have existed over the years in Sullivan area that may be contaminating the ground water beneath the city. TRW has delineated the horizontal and vertical extent of TCE concentrations in the ground water that may have come from the former TCE facility and are above the MCL. To understand the potential ground water migration pathways, TRW conducted detailed hydrogeologic evaluations of the aquifer. Based on these investigations, the only well effected by TCE-impacted ground water from beneath the former TRW facility is Municipal Well No. 2.*

*As previously noted, it is unlikely that TCE concentrations from the former TRW site migrated to Municipal Well No. 8. Instead, it is suspected that the elevated TCE concentrations detected in this well are the result of a separate source(s) of TCE in the vicinity of the well. Several businesses in the Sullivan area, including a few in the vicinity of Municipal Well No. 8, have used or are currently using TCE. Therefore, separate sources for the TCE concentrations detected in Municipal Well No. 8 (and other municipal wells outside of the TCE limits established for the former TRW site) are suspected. In spite of this, and without a regulatory requirement to do so, TRW agreed to remediate the ground water pumped by Municipal Well No. 8. This decision was not based on acknowledgement that TCE concentrations had migrated from the former TRW facility, but was based on a desire to address this matter in an expeditious manner.*

*TRW is not responsible for the TCE concentrations in the ground water outside the delineated plume (shallow, intermediate, and deep zones) and therefore, should not be responsible for implementing a contingency plan for other locations outside this area. For the record, TRW has already gone beyond what is required from a regulatory standpoint at two of the locations (Municipal Well No. 8 and Homeowner Well No. 111) where the DWCP was already implemented.*

*In addition, analytical results from monitoring well OBG-15S (located just northwest of the site on neighboring Meramec Industries property) have exhibited the compound 1,1,1-trichloroethane (1,1,1-TCA). According to available records, this compound was not used at the former TRW facility and its presence is likely related to the use of 1,1,1-TCA from the Meramec Industries facility or other potential source(s) in the area.*

*However, the important facts are that: 1.) Elevated concentrations of 1,1,1-TCA have not been detected in water from the municipal wells where TCE was detected; and, 2.) 1,1,1-TCA is a chlorinated solvent with similar physical/chemical properties as TCE, so both of these compounds would travel in a similar manner in the same hydrogeologic environment. Therefore, the lack of detection of 1,1,1-TCA in municipal well samples further supports that TCE-impacted ground water from the former TRW facility has not migrated to other municipal wells.*

*Further source-area investigations area are warranted at other locations in Sullivan to identify additional sources of VOCs not related to the TRW site which may be causing the TCE-contamination of ground water. In addition, the City of Sullivan should be required to pass an ordinance requiring businesses to register TCE purchases and have solvent-handling plans.*

#### **Agency Response #11 (continued):**

**The subject of other sources of TCE releases has been discussed several times throughout this response to comments, including the ongoing investigation being conducted by the department's Superfund Section. TRW will be notified if any additional TCE sources are located as a result of this investigation.**

**Regarding Municipal Well No. 8, evidence supporting the potential of TCE migrating from the former TRW site to Municipal Well No. 8 was presented by the agencies. TRW contended that the two monitoring wells located between the site and Municipal Well No. 8 showed no TCE, and therefore, there was no connection. However, geologic data presented by TRW in the RFI clearly demonstrates the presence of a fault also located between the site and Municipal Well No. 8. This subsurface geologic feature may be a major contributor to TCE dispersion from the shallow zone into the intermediate zone of the aquifer and may influence groundwater flow and contaminant transportation pathways. The two monitoring wells (OBG 14-D and OBG 14-DD) referenced above do not appear to monitor across this fault zone and only monitor a very small percentage of the saturated subsurface. This fact, combined with the presence of a known fault in this area and a cone of capture associated with a municipal well, make it extremely possible for contaminants to migrate in such a manner as to bypass the anticipated flow regimes of the aquifer that TRW currently has monitored. Unless a monitoring well is installed which was screened/open hole across the entire saturated geologic formation(s) conclusively verifying that no TCE is migrating towards Municipal Well No. 8 from the westerly direction, it remains the interpretation of EPA and the department that the source of the contamination in this well is from the TRW facility. The rationale for the potential of contaminant transport will also be applied to any other municipal well where the cones of capture clearly extend into the monitored TCE plume.**

#### *Summary*

*The ground water quality samples from the site have been collected in accordance with the MDNR-approved GMP from properly installed monitoring wells at the site. There are no reasons or facts to question the adequacy or reliability of these data. TRW has*

*conducted the RFI investigations in a timely, proactive manner with concurrence from the USEPA, MDNR, and DGLS to be protective of the health of the local citizens. The data were collected in accordance with the approved plans and provide a sound technical basis to support the conclusions presented in the approved RFI.*

*Additional source investigations should be conducted in the Sullivan area based on the number of potential sources of contamination from parties other than TRW that may be impacting the ground water quality of the city. Ground water samples are supported by the data collections and analysis procedures outlined in the RFI Work Plan and associated Quality Assurance Project Plan (QAPP). These data led to the delineation of the horizontal and vertical extent of TCE concentrations related to the former TRW facility. Monitoring of the TCE concentrations in accordance with the approved GMP is continuing and is designed to be protective of the City of Sullivan drinking water supplies from TCE concentrations attributable to the former TRW facility.*

### **3.0 PROPOSED REMEDY**

- A. Unless there is a statutory requirement under RCRA, we believe that five-year review cycles similar to those conducted under CERCLA would be more appropriate for such a remedy rather than the three-year reviews proposed herein.*
- 3. TRW would like to reserve the future option to evaluate the possibility of whether effluent from this system might be better utilized for re-injection to the ground water after treatment rather than assuming it must continue to be discharged to the POTW as stated.*
- 5. Regarding the determination that implementation of the DWCP will be also be based on “any new information made available to the EPA/MDNR,” please note our closing comments at the end of this letter.*

#### **Agency Response #11 (continued):**

**Five-year review cycles for the remedy are consistent with standard remedy implementation reviews; therefore, the finale remedy will be modified to reflect this. However, we note that the agencies would seek to modify at any time the monitoring and contingency plans (GMP, DWCP, P&TP) in the remedy based upon changing conditions in contaminant concentrations, groundwater flow conditions or any issues associated with protection of human health and the environment.**

**Regarding re-injection of effluent from the on-site groundwater treatment unit, any such activity would require approval by all agencies involved, including the receipt of all applicable approvals/permits from the department’s WPCP and DGLS. (Given the lack of hydrologic control of the underlying aquifer system(s) and potential for increased vertical migration of contaminants, approval for groundwater re-injection into an area of known contamination seems highly unlikely at this time.)**

B. *Regarding installation of the treatment system at Municipal Well No. 8, TRW takes exception to the assumption that any TCE detected in ground water from this municipal well is our responsibility. Please note that based on all data obtained from OBG-14 well nest (S/D/DD), the ground water quality between the former TRW facility and Municipal Well No. 8 is not impacted with TCE at concentrations above MCLs. As explained previously, TRW's position is that we voluntarily installed this system in the interest of providing an expeditious solution to the City's water needs.*

1. *It is stated here that "If...the aeration system...at No. 8 is deemed inadequate by the MDNR...TRW will be required to design an alternative system...". Since this treatment system has provided safe, potable water from this well for over 15 months, this statement needs to be further clarified as to exactly what criteria would be used to judge adequacy (if indeed any further work is required by TRW based on the comments above).*

**Agency Response #11 (continued):**

**The agencies' determinations, rationale and expectations of TRW on this topic are outlined previously in this and other comments.**

- C. *Additional installation of monitoring/recovery wells as part of the CMI Work Plan.*
2. *Regarding installation of a new groundwater monitoring nest at location OBG 20S, it should be noted that water levels in various shallow wells are trending downward during recent monitoring events due to over-pumping and dewatering of this limited extent aquifer. Therefore, the requirement to install shallow replacement monitoring wells (such as at OBG-20S) is valid, as long as the data from those wells continue to provide important information regarding plume delineation that can not be obtained from existing wells. In addition, we should not be expected to continue to assess the occurrence of TCE in ground water beyond the extent of the plume from the former TRW facility. Also, continued delineation of TCE north of the TRW plume by installing additional shallow and intermediate monitoring wells (e.g. OBG-20S replacement and OBG-20D) serve no clear purpose as related to the former TRW facility. Furthermore, it should be noted that, following construction of well OBG-20S, the water level measured in this well was 15.75 ft above the bottom of the 20-ft section of well screen. Therefore, this well was properly installed to assess the static ground water conditions in the shallow zone. Since that time, the shallow ground water level has consistently decreased to current levels near the bottom of the well screen. The ground water quality information from OBG-20S as presented in the RFI was collected at or near static ground water conditions (without operation of Municipal Well No. 2) and was collected when the level of saturation was similar to other shallow monitoring wells. Therefore, the data presented in the RFI are representative of conditions required for delineation of the extent*

*of the VOC-impacted shallow ground water to the north of the site. (Also, please see previous comments under “Nature and Extent of Contamination.”)*

**Agency Response #11 (continued):**

**The agencies concur that, at the time of the RFI, monitoring well OBG-20S provided accurate and representative data displaying the northerly extent of TCE in the shallow aquifer. However, consistent with corrective action at other facilities in Missouri, TRW must maintain contaminant monitoring sufficient to determine the rate and extent of releases. If conditions such as groundwater level fluctuate over time, we expect that sampling/monitoring activities must be adjusted as necessary to verify the rate and extent of releases. Therefore, monitoring wells that go dry for whatever reason will be replaced if they are in a necessary location for contaminant monitoring. Monitoring well OBG-20S is the northerly boundary shallow well for the TCE that has originated from the former TRW facility.**

*Some other comments also appear to be warranted. First, we would like to clarify that neither TRW nor the EPA/MDNR has ever recommended that the final remedy for this program be limited to the existing IRM pump and treat (P&T) system at the former TRW facility. The existing P&T system will continue to operate as a source reduction measure, in conjunction with other protective measures that are currently in place. In addition, the selected remedy as presented in the CMS satisfied the RCRA requirement to protect the health of the citizens of the City of Sullivan. Under no circumstances should water that is unsafe for human consumption (e.g. above the MCL) be allowed to be discharged into the public water supply system, regardless of what treatment technology is implemented at a particular municipal well.*

*TRW has clearly demonstrated that is dedicated to providing the residents of the City of Sullivan with a safe source of drinking water at those locations where contamination is clearly attributed to past activities at the former TRW facility, and will continue to follow this philosophy in the future. However, given the history of industry in the Sullivan area and the extent to which TCE has been identified in municipal wells, TRW can not be reasonably expected to take responsibility for TCE contamination in each city well that exhibits detectable levels of TCE in the future. While TRW has voluntarily agreed to provide potable drinking water at several impacted drinking-water wells, the claim that the former TRW facility is the source of all TCE found in each City of Sullivan municipal well is unrealistic and contrary to all available data.*

**Agency Response #11 (continued):**

**The agencies agree with TRW’s assessment that there are other TCE sources in the Sullivan area based upon currently available information. The presence of tetrachloroethylene (PCE) and benzene in the Oak Grove Village municipal supply well seems to confirm this, as those two contaminants are not known to be associated with**

**TRW's operating history at the facility. However, TRW does have a TCE plume that is in a deep portion of the aquifer from which the City of Sullivan draws its water. Therefore, any municipal well in the vicinity of the former TRW facility that has TCE contamination will be closely evaluated. As displayed in the past at the Peterson private well and the Oak Grove Village municipal well, TRW is not getting blamed for all contamination in the Sullivan area. The agencies understand TRW's point of view on the issue; however, there are a great deal of unknowns in this scenario with, at this point, no other major sources of TCE located.**

#### **4.0 SUMMARY OF FACILITY RISKS**

*As the Municipal wells are open-hole bedrock from 350 below grade to over 1000 ft below grade (and some deeper), the majority of the water produced by the municipal wells is derived from the more prolific zones in the deeper portions of the Ozark Aquifer (below 550 ft). The SB misleadingly suggests that the municipal wells derive the water solely from the intermediate and deep ground water aquifer zones, which are in the shallow portions of the Ozark Aquifer. It should be noted that the characterization of shallow, intermediate, and deep ground water zones are terms coined by TRW to discuss the ground water in the deeper portion of the Ozark Aquifer. The few remaining private wells in the area are considerably shallower than the municipal wells and only extend to depths of approximately 350 ft, which corresponds to the shallower portions of the Ozark Aquifer.*

*The statement in the SB, "Use of water from contaminated...wells...has the potential to affect the health of people using this water." should be clarified. It should be noted that the DWCP and GMP are in place to prevent adverse affects to human health, such as the IRM in place at Municipal Well No. 8."*

*Regarding the situation at Municipal Well No. 2, the SB incorrectly implies that operation of this well was limited to "only when necessary" due to the presence of TCE. This well has been a viable water source to the City for about 50 years and has supplied water depending on local needs. It has only been relatively recently that the presence of TCE in this well has affected its operation. This section of the SB should also indicate that Well No. 2 has only been temporarily removed from active service. Also, it should be clarified that the City ordinances restrict design and installation of private/homeowner wells within the city limits.*

*The following sentence in this section of the SB is inappropriate: "If a new private or municipal supply well is installed which draws water from a zone(s) of the aquifer known to be contaminated by releases from the TRW facility, that well would be required to be sampled by TRW as part of the GMP." Rather, a mechanism should be developed and put into place to prevent installation of any new wells potentially impacted by the defined TRW plume.*

#### **Agency Response #11 (continued):**

**The SB language will be edited to reflect that the municipal wells do not solely derive their water from the intermediate and deep zones of the Ozark Aquifer monitored by TRW.**



**The SB language will be edited to reflect that, if untreated water from contaminated wells were ingested, potential health effects could arise. The goals of the GMP and DWCP will also be referenced in this section of the SB.**

**Regarding the city's use of Municipal Well No. 2, the "only when necessary" usage did apply for a duration of time in the early and late 1990s, as reported to the department by City of Sullivan staff. However, TRW is correct that this water supply well has been a viable and valuable source of water, having not gone above the MCL for TCE until the 2<sup>nd</sup> Quarter 1999 sampling event, at which point the well was deactivated. The language in the SB will be edited to reflect this, including that the deactivation of Municipal Well No. 2 is temporary until such time as the approved treatment unit is in place and operating efficiency confirmed. The City ordinances restricting design and installation of private/homeowner wells within city limits was detailed in the SB. Ordinances, however, may change, and the agencies do not have the authority to require the city to pass or maintain any such ordinances as part of the final remedy.**

**Regarding the statement made in the SB concerning consumption of contaminated groundwater as referenced above, that language is factual and has been asked of the agencies by the public. It will remain in the SB.**

**EPA and the department will seek to discourage the installation of new water wells into the contaminated portion of the aquifer. If necessary and appropriate, EPA and the department would seek to use whatever legal means available to prevent the drilling of such wells if it would endanger human health or the environment or interfere with the implementation of the corrective action remedy.**

#### **7.0 EVALUATION OF THE PROPOSED REMEDY AND ALTERNATIVES**

*The statement that "A third shallow recovery well was installed in the second quarter of 1999." should be clarified that this well was actually installed in the fourth quarter of 1998 and made fully operational during the second quarter of 2000.*

*The SB states that "Alternative #4 would require a new municipal well to replace Municipal Well No. 2, ...". This should be clarified to indicate that this alternative might require a replacement municipal well. It should also be clarified that construction of the IRM treatment system at Municipal Well No. 2 is already underway.*

#### **Agency Response #11 (continued):**

**The SB language will be edited to reflect TRW's statements.**

#### **8.0 PUBLIC PARTICIPATION**

*In the event it is decided that the appropriate technical documents associated with this project at the Sullivan Public Library should be supplemented, we would be happy to assist you in providing any documents deemed relevant. With regard to public involvement, we want to go on record to say that TRW had diligently tried to involve the*

*public in this process to the extent practical. We have attended several public City Council meetings and have met privately with City officials on numerous occasions. It should also be noted that TRW and the City have worked cooperatively on this matter for over 10 years until the recent political changes in City government. It is TRW's desire to return to a joint cooperative approach to address these issues.*

*As you're aware, TRW has already expended a vast amount of time and effort to perform the various ground water and source investigations. This has led to our development of an excellent technical knowledge and understanding of site conditions, especially the complex subsurface geology in this area. We hope that due consideration can be given to our knowledge of the site as you review these comments, plus any supplemental information you may receive during this Comment period (e.g. additional ground water modeling efforts).*

*We understand that the City is currently in the process of submitting additional computer modeling results of the ground water flow conditions at the site performed on their behalf by Barr and Associates. Based on our limited review of their initially proposed modeling strategy, that modeling will not be adequate to assess the source of TCE contamination detected in the municipal wells for following reasons:*

- A simple "layer-cake" model as originally proposed cannot possibly reflect the known geological conditions at the site with its presence of significant faults.*
- Model assumptions of constant-head boundaries in the shallow aquifer are not appropriate based on the hydraulic properties noted in the shallow aquifer.*
- Model results will be ambiguous if other potential sources of TCE are present in the area, which is a likely situation as described previously.*

*Therefore, we respectfully request an opportunity to review, comment, meet and discuss any additional data which is made public during the Comment period and which the Agency considers pertinent in arriving at a final decision for the remedy of this site. TRW believes that our comments to this most recent modeling data should be included in the administrative record for the SB and needs to be considered in any final remedy selection.*

*During the selection of a final remedy, we expect MDNR and EPA to adhere to the same philosophy as implementation of the DWCP – that remedial action is only justified under RCRA Corrective Action where elevated contaminant levels are determined to be the result of releases from the former TRW facility. In this way, we are hopeful the final remedy can proceed rapidly.*

*We appreciate the opportunity to provide comments to the draft SB.*

#### **Agency Response #11 (continued):**

**The agencies have reviewed the groundwater model submitted by the City of Sullivan and are familiar with the limitations of such models. This information will only be used as**

**appropriate. The department made sure TRW was aware of the groundwater model so as to allow concurrent review and will continue to share with all parties involved any data upon which any determinations are based.**

**Closing Agency Remarks:**

The agencies appreciate the time and effort of all commentors, attendees at the public notice functions and all other interested parties. The agencies have devoted a great deal of effort into the evaluation and structuring of the final remedy and hope to have addressed all comments in a satisfactory manner. The Statement of Basis and final remedy will be edited to reflect the changes discussed in this Response to Comments document.

If you have any questions regarding the TRW project, please contact:

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